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THE FOSSIL REPTILES OF ENGLAND.

In introducing the following very elaborate paper to our readers, the anatomical skill and great analogous knowledge displayed in which produced such a sensation at the late Plymouth Meeting of the British Association that 250*l.* were unanimously voted from the funds towards its publication in a separate form, we have much pleasure in referring to the impression it made upon us, and our consequent anticipatory recommendation of that step in our last *Gazette* (p. 510, col. 3). In the meanwhile, it is also a source of gratification to us to be able to lay a perfect analysis of it before the world; and thus, exhibit, certainly, the most interesting and important feature of this year's proceedings for the general information.

Passing over the details of structure which are absolutely necessary to the full understanding of the subject by the philosophers of our own and other countries, the mind is, as if by a wonderful natural enchantment, chained to the exciting idea of "What must our Island have been, when solely inhabited by these monsters, to which all fabled worms, and serpents, and dragons, are but as puerile creations of the imagination?" A tropical climate, vast marshes, and plants as enormous and nearly as shapeless as themselves, "possessed it wholly." Was it near the beginning of animated being? And since that distant geological period, have new creations, fitted to an improving earth, repeatedly manifested the power and the glory of the Author of all things? It would seem so; and last of all man was made. Compare the elegant deer, the sagacious elephant, the noble horse, or others of the higher class of mammalia, and man himself, with these enormous snakes and flying lizards; and we see and recognise the blessings which an All-wise Providence had in store for a superior race, to whom the renovated earth was to be given as an inheritance. And Man—has he not improved in physical and intellectual progress since he first appeared from the hand of his Maker? Surely he has; and even yet may be but the link upwards to a higher gradation in the scale of being. Winged angels may inhabit our sphere before it utterly pass away; and all the knowledge of our day, anxious as we are to acquire it, groping between darkness and light, be to them the foolishness of children, and the whisperings of ignorance.

But fancy and speculation must not lead us from Mr. Owen's splendid revival of an older world, when the crocodile on the banks of the Thames was the same as now ploughs the river banks of Borneo with its long snout; and the iguanodon, the bones of one of which still lie buried beneath the town of Horsham, *its cranium under the church, and its tail under the market-place*,* ranged abroad in dimension six times greater than the largest elephant! when the newly discovered creature of his Report displayed the mingled forms of the lizard, the crocodile, and the turtle, with a parrot's beak, and a slight proportion of the toad to complete its strange anomaly; when the Isle of Sheppey was a sea inhabited by true marine turtles, and not fresh-water, as supposed by Cuvier; when boas thirty feet in length would have crushed the people of England, if England had been peopled, instead of some solitary example of a foreign import in a Surrey Zoological Garden.

And the grand conclusion, so essential to science and our knowledge of creation—that in all these creatures the structure was peculiar to each, and adapted to the condition of the earth at the time; that there was no gradation or passage of one form into another, but that they were distinct instances of Creative Power, living proofs of a divine will, and the works of a divine hand, ever superintending and ruling the existence of our world.*

Professor Owen communicated the second and concluding portion of his Report 'On British Fossil Reptiles,'† which was illustrated by numerous drawings and diagrams, with sections of the strata characterised by the remains of the Reptilian species described in the Report. After some prefatory observations on the general nature and affinities of the recent and extinct reptilia, and the parts of the organisation of the latter, which, by their modifications, afforded the best characters for their determination, the author proceeded to give a recapitulation of the leading peculiarities of the *Enaliosauria*, which formed the subject of the first part of the Report, and a brief summary of the results of the labours of previous geologists and naturalists in the field which the second part of his Report had led him to explore. The first section of the Report was devoted to a description of a large reptile, the type of a new genus, to which the name *Pliosaurus* was given, and which formed the link connecting the plesiosaurus with the crocodile family.

Mr. Owen observed that large, simple, conical teeth, with the enamelled crown traversed by well-defined and abruptly terminated longitudinal or oblique ridges, as in the teeth of the plesiosaur, had not unfrequently been discovered in the Kimmeridge clay formation. These teeth differed from those of the plesiosaurus in their greater relative thickness as compared with their length, and in the subtrihedral shape of their crown: the outer side is slightly convex, sometimes nearly flat; it is separated from the two other parts by two sharp ridges; these are more convex, and the angle dividing them is often so rounded off, that they form a demi-cone, and the shape of the tooth thus approximates very closely to that of the mosasaurus, with which it is equal in size. It may be readily distinguished, however, even when the crown only is preserved, by the ridges which traverse the inner or convex sides, the outer flattened surface alone being smooth; but an entire tooth of the present extinct reptile presents a long fang, which at once removes it from the acrodont group of lacertine saurians, and allies it with the thecodont reptiles, among which it approaches nearest, in the superficial markings of the crown, to the plesiosaurus. The known parts of the skeleton of the gigantic extinct reptile, to which the teeth in question belong, confirm this approximation; but the vertebræ of the neck are so modified, that the peculiarly elongated proportion of this part of the spine, which characterises the typical plesiosauri, is exchanged for one that much more nearly approaches the opposite condition of the cervical region in the ichthyosauri. This abrogation of the main characteristic of the plesiosauri, combined with the more crocodilian proportions of the teeth, established the claims of the pliosaurus to generic distinction. In the collection of Professor Buckland at Oxford, is preserved a considerable proportion of both upper and lower jaws of a gigantic specimen of the pliosaurus, from the Kimmeridge clay formation at Market-Raisin. The teeth are arranged in separate sockets, in a close and regular series, along the alveolar borders of the intermaxillary, maxillary, and premandibular bones. Twenty-six sockets may be counted on the most perfect side of the upper jaw, but the series is evidently incomplete posteriorly. An interspace, not quite equal to the breadth of a socket, divides the fourth from the fifth tooth, counting backwards, and the jaw is slightly compressed at this interspace; the four anterior teeth, thus marked off, occupy the slightly expanded anterior extremity of the upper jaw, but do not present the excessive size of the corresponding teeth in the plesiosauri. There are thirty-eight teeth on each side of the lower jaw; the teeth begin to diminish in size beyond the fifteenth, and at the posterior extremity of the series the sockets are less than half an inch in diameter; in their close arrangement and position they correspond with those of the upper jaw. The teeth, which are preserved in this magnificent cranial fragment, present the characters described at the commencement of this part of the Report. The inserted fang of each of these teeth is four inches in length; the entire tooth being thus seven inches in length. The ridges which divide the outer from the inner surfaces of the tooth subside at the base of the crown; the fang is smooth, assumes a subcircular form, gradually expands for about half its length, and then contracts to its termination; but this is always less pointed than in the fully formed teeth of the true plesiosauri. In the old teeth with the elongated fang, the pulp cavity remains open, as in the plesiosaurian teeth; it presents at the expanded part of the fang a narrow elliptic transverse section. In a tooth of the present species, six inches and a half in length, from the Kimmeridge clay at Shotover, the diameter of the persistent pulp cavity was thirteen lines. The teeth consist of a central body of compact dentine, with a coronal investment of enamel, and a general covering of cement. The dentine consisted of fine calcigerous tubes, without admixture of medullary canals. The arrangement, division, secondary

* Enough to remind one of the legendary Dragon of Wantley—

"With a sting in his tail,
As long as a flail,
Or very near hand it, I warrant ye."

But these antediluvian monsters seem to be the prototypes of fable, superstition, and romance.—*Ed. L. G.*

* In this we have chosen to anticipate the Monday's, rather than report the Friday's Proceedings in Section C.

† This Report was called for at the meeting of the British Association at Newcastle, in 1838.

The first part, 'On the Marine Sauria,' was read at Birmingham, August 1839.

undulations, and branches of the calcigerous tubes, corresponded so closely (Professor Owen observed) with those of the teeth of the plesiosaurus, as to render a particular description of them unnecessary. The germs of the successional teeth in the pliosaur were developed at the inner side of the basis of the old teeth, but did not penetrate these teeth; the apices of the new teeth make their appearance through foramina situated at the inner side, and generally at the interspace of the sockets of the old teeth. Here, therefore, it was stated, as perhaps also in the pterodactyle, the growing teeth may be included in closed recesses of the osseous substance of the jaw, and emerge through tracts distinct from the sockets of their predecessors, which was an exceptional condition of the reproduction of the teeth in reptiles.

Of the Vertebral Column.—A long neck has been considered to be so peculiarly the distinction of the plesiosaurus, that a species which has this part of the spine shortened and reduced by the flattening of the vertebræ to ichthyosaurian proportions, may be reasonably regarded as at least subgenerically distinct, especially when the enormous and massive head, to which the abbreviated neck bears a subordinate relationship, is armed with teeth which have just been shewn to be as remarkable for their thickness and strength as those of the plesiosaurus are for their slender and sharp-pointed proportions. Perhaps there is no example, save the genus pliosaurus, in the whole class of reptiles, living or extinct, which has any of the vertebræ presenting such proportions as those of the following specimen in Dr. Buckland's collection from the Kimmeridge clay of Foxcombe Hill, near Oxford. The breadth of the body of this vertebra is six inches; its depth, or vertical diameter, five inches; while in length, or the diameter corresponding with the axis of the body, it measures only an inch and a half. But cervical vertebræ of similar proportions have been discovered in the Kimmeridge clay near Weymouth, and were described some years ago by Mr. Conybeare in the "Geological Transactions." The Market-Raisin specimen in the Oxford Museum proves that those peculiarly compressed vertebræ are associated with the large and well-defined teeth also characteristic of the same formation, and with jaws of enormous strength, which could only be supported and wielded by a neck as short and as strong as that of the elephant. The vertebræ, as they receded from the head, increased in breadth and depth, but retained the same length, as they do throughout the spine in most saurians whatever may be their other dimensions. But in the dorsal region of the spine of the pliosaur, the vertebræ acquire a great increase of length, and there assume the ordinary proportions of plesiosaurian vertebræ: *ex. gr.* the first dorsal vertebra of the Market-Raisin specimen, which is four inches three lines in breadth, and four inches in depth, measures nearly three inches in length. The posterior dorsal vertebræ slightly increase in depth, and with the same transverse diameter they present a length of 3″ 2‴. The height of one of these vertebræ, including the spinous process, is eleven. These proportions are retained at least to the base of the tail. A vertebra from this part, obtained from St. Giles's gravel-pit, near Oxford, and probably washed out of the Kimmeridge clay, measures in length three inches; in the breadth of the body, 4″ 9‴; in the depth of the same, 4″ 4‴.

Mr. Owen observed, that in the extreme difference which the vertebræ of the neck and those of the rest of the trunk presented in regard to their length, the pliosaurus formed a remarkable exception to all the saurian group; for in the true enaliosauria, in crocodiles, in lizards, whatever other modifications the vertebræ might undergo, or however much they might be expanded in breadth or depth, they maintained remarkable constancy in the length or antero-posterior diameter of the bodies of the vertebræ. The pterodactyles, or flying-lizards, offered an exception to this rule, and the cervical region was here likewise the seat of the variation; but whereas in the pliosaur the cervical vertebræ were remarkable for their shortness, in the pterodactyle they differed from the other vertebræ in their extreme length. The general structure of the vertebræ of the pliosaur corresponds closely with that of the plesiosaur. The osseous texture is compact at the circumference of the vertebræ, and coarsely, but uniformly, cellular in the rest of the bone. The neurapophyses do not become anchylosed to the centrum, nor the ribs to the costal processes. The articular surfaces at each end of the centrum are flat in the cervical, very slightly concave in the dorsal, rather more concave in the caudal vertebræ. The cervical ribs, judging from their articulation with the centrum, must have been unusually strong. They were supported on two transverse processes, slightly raised beyond the level of the centrum, occupying two-thirds of its antero-posterior extent, and divided by a deep and well-marked linear fissure. In the anterior cervical vertebræ above described, with a length of 1″ 9‴, and a height of centrum of 3′ 3‴, the antero-posterior diameter of the constant surfaces was 1″ 2‴; their united vertical diameter, 2″ 2‴. They occupy a space nearly equidistant from the upper and lower surfaces of the centrum. At the base of the neck they begin to rise, as in the plesiosaurus, upon the neurapophysis, and are supported, in the dorsal region, upon a single stout transverse process. This is subdepressed, with an oval transverse section, which is rather sharp at the anterior margin. The spinous process of the dorsal vertebræ is nearly straight; compressed laterally, its antero-posterior diameter was 2″ 8‴; in a vertebra, measuring in the same diameter 3″ 2‴, its height from the base of the neurapophysis was seven inches. The sides of the centrum, are rather rugous near the articular ends, elsewhere smooth and concave, especially in the dorsal vertebræ. The lower surface has the two vascular perforations in the cervical regions; the vertebræ become slightly contracted towards this part in the dorsal region. In the caudal vertebræ the costal process is single, vertically elliptical, and prominent. The non-articular surface of the centrum is not very regular, but is smooth; the lower surface is square-shaped, and nearly flat; its angles are marked by the hæmapophysial surfaces, of which the anterior pair is the largest.

Bones of the Extremities. Humerus.—The type of construction of the bones of the extremities most closely accords with that of the plesiosaurus. The pectoral arch owes its chief strength to a pair of immensely expanded coracoids, having a broad and short entosternal bone on their anterior interspace, and supporting the acromial process of the scapula, or the clavicle, which is anchylosed to that part of the scapula. Besides the localities affording specimens from which the general description of the bones of the trunk and extremities is taken, and which localities are noticed in that description, Professor Owen had detected remains of the pliosaur in the following localities:—A small cervical vertebra from Shotover, in the Oxford Museum; four dorsal vertebræ, equal in size with the Market-Raisin specimen, from Marcham, also in the Oxford Museum; the vertebra in the York Museum,* said to have been found in the gravel of Burn, one mile below Minnykirk, Northumberland, and noticed in the first edition of Lyell's "Principles of Geology," is a posterior cervical of a *Pliosaurus brachydeirus*; and must be presumed to have been accidentally introduced into that recent deposit. Amongst the several opinions from these different localities which he had had opportunities of examining, Professor Owen had procured unequivocal indications of two distinct forms or species of the present gigantic sub-genus, which connects the enaliosauri to the teleosauri. The difference in breadth and height, and especially in the size of the hatchet-bone, or cervical rib, as indicated by the articular surface, appeared to him to be inexplicable, except on the supposition of two distinct species. The difference is continued in the dorsal vertebræ, the transverse processes of which are more compressed, and the non-articular surface more rugous in the Shotover than in the Market-Raisin species. Should subsequent discoveries lead to an extensive and more precise determination of the two species above indicated of the present very remarkable and interesting annectant genus, the term *brachydeirus*, which Professor Owen had first proposed for the species represented by the magnificent remains from Market-Raisin, would be equally applicable to the short-necked gigantic pliosaur from Shotover, and consequently lose its value as a distinctive appellation; he therefore proposed to dedicate the two species to Dr. Buckland and Mr. Conybeare, to which distinguished geologists the first indications of the pliosaur, under the names of *Plesiosaurus recentior* and *Plesiosaurus giganteus*, were due.

The remains of the saurians of the crocodilian family, which complete the transition from the enaliosaurs to the terrestrial lizards, were next noticed. The Report included descriptions of the fossil crocodiles in the British formations between the eocene tertiary strata to the oolite inclusive; and it was observed, that the distinct species deviated from the organic type of the existing crocodiles in proportion as their remains occurred in strata geologically more remote from the present time. Not any of the species were identical with those now known to exist; and the modifications of structure in which they differed were much more considerable than any which distinguish the skeletons of the existing species from each other. Extinct crocodiles, with the ordinary ball and socket articulation of the vertebræ, in which the cavity is on the forepart; the species with the position of the ball and socket reversed; and those in which the vertebræ present a biconcave structure,—all occur in the English formations. The extinct species, agreeing in vertebral characters with the present crocodiles, were first described: these were from the eocene formation called the London clay. Of these the *Crocodilus toliapicus* was first described. It chiefly differed from existing crocodilians, both true crocodiles and gavials, in the larger relative size of the superior temporal foramina, but approached the gavials, like the Bornean crocodile (*Croc. Schlegelii*), in the

* In the York Museum there is preserved a humerus of a pliosaur, from the lower part of the Kimmeridge clay deposit at Spearton, which measures thirteen inches in length, and seven inches across the distant end: the femur of the same specimen measured sixteen inches in length.

length and slenderness of the muzzle; and as in that species, the upper jaw slightly expands about one-third from its termination, then slightly contracts, and afterwards again a little expands at the termination of the muzzle. The teeth are twenty-two in number on each side of the upper jaw, and twenty on each side of the lower; their crown is sub-circular, conical; traversed by an anterior and posterior longitudinal ridge, with intervening five longitudinal striæ. They resemble those of the *Croc. Schlegelii* in their greater uniformity of size and regularity of interspace, as compared with true crocodiles and alligators. Many other characters of the *Crocodilus toliapicus* were described by Professor Owen; and remains of the same species were noticed from the London clay at Bracklesham, and from the equivalent sand-beds underlying the red crag at Kyson. The Report next proceeded to notice the fossil crocodiles from the more recent secondary formations; and the first species described was one from the wealden of Tilgate and other parts of Sussex, which, from the modification of its teeth, was indicative of a subgeneric deviation from the true crocodilian type, for which the name of *Suchosaurus* was proposed. The *Crocodile d'Argenton* of Cuvier was stated to be probably nearly allied to this subgenus, the dental characters of which had been given by the author in his "Odontography," under the name of *Crocodilus cultrideus*. The dental, dermal, and part of the osteological characters, were next minutely described of a distinct subgenus of crocodilians from the wealden beds, the typical species of which was named *Goniopterlis crapideus*, in allusion to the regular quadrangular form of the large bony plates which defended the skin, and to the thick, obtuse form of tooth with which these scutæ were associated. This species Professor Owen regarded as more completed mailed than any of the crocodile family. The localities mentioned in which remains of this species had been found, were Tilgate Forest, the Purbech limestone at Swanage, and the Hastings beds near Battle Abbey. The consideration of the remains of the extinct family of crocodilians, characterised by the biconcave stucture of the vertebræ, and including the genera called steneosaurus and teleosaurus, next occupied a considerable proportion of the Report. A minute comparison of the characters of these saurians with those of other known existing and extinct species being requisite, in order to solve the doubts expressed by Cuvier in his later editions of "Ossemens Fossiles" on this subject, and also to determine the relationship subsisting between the British and Continental species of the teleosaurian family. The remains of the teleosaurians occur most commonly in the lias of the Yorkshire coast; and from an examination of these, Professor Owen had been enabled to contribute many facts towards the completion of the osteology of the genus, its essential relationship to the loricated saurians, and its specific distinction from the *Teleosaurus cadonensis*, the remains of which are so abundant in the oolitic formations near Caen in Normandy. A minute description was given of the form and disposition of the osseous scutæ, forming the dermal armour of the *Teleosaurus Chapmanni*. Specimens were noticed in the British Museum; the Museum of the town of Whitby; the Oxford Museum; the collections of the Earl of Enniskillen, of Sir P. Egerton, Mr. Ripley of Whitby, Mr. Bowerbank, Mr. Saull; Philosophical Institution at York; at Scarborough; of the Natural History Society of Lancaster; and other palæontologists. Professor Owen had not found unequivocal evidence of the remains of the *Teleosaurus Chapmanni*, except in the lias of the Yorkshire coast. But he described parts of the *Teleosaurus cadonensis* from the Bath oolite at Enslow, near Woodstock; and from the oolite at Stonesfield. The vertebra of a teleosaurus, of apparently a distinct species, was described, from the oolite near Chipping Norton. A fourth species, characterised by the small relative size of its cervical ribs, was indicated by a cervical vertebra and a dermal scuta, from the Kimmeridge clay at Shotover. Remains of the genus steneosaurus, as restricted to those gavial-like crocodilians, with biconcave vertebræ, but distinguished from teleosaurus by the subterminal position of the nostril, were described, from the Kimmeridge clay at Shotover, and from the oolite of Stonesfield. The most interesting fact described from remains of the present genus was the size and form of the brain, as exhibited by an internal cast of the cerebral cavity exposed in a cranium in the Woodwardian collection at Cambridge. The cerebral lobes were smooth and convex, as in existing crocodiles; behind these a portion of the large optic lobes was visible. The length of the cerebrum was one inch and two-thirds; its breadth one inch and a half; the whole length of the brain represented by the cast was two inches. The breadth of the cranium in this interesting fossil was six inches and a half; from the occiput to the commencement of the narrow elongated jaws, eight inches. Remains of that division of the steneosauri of Geoffrey St. Hilaire, to which the name of *Streptospondylus* has been given by M. Von Meyer, were stated by Professor Owen not to have been recognised in any British strata previous to the present Report. Very characteristic vertebræ from the anterior and the posterior part of the dorsal region, shewing the reversed position of the ball and socket; the deep lateral depression and the oblique buttresses of the transverse processes were described, from the lias near Whitby, and the oolite near Chipping Norton. After concluding the account of the higher organised or loricate sauria referable to the crocodilian, teleosaurian, and streptospondylian types, characterised respectively by the ball and socket, the biconcave, or the reversed ball and socket structure of the vertebræ, and agreeing in general size with the crocodiles and gavials of the present day, Mr. Owen next proceeded to describe the remains of much more gigantic saurians, which occur from the green-sand to the oolite inclusive, and have been found in different localities in England. These enormous saurians, some of which must have rivalled the modern whales in bulk, may be presumed to have been of strictly aquatic and most probably of marine habits; in evidence of which the Professor called attention to the biconcave structure of the vertebræ, and the coarse cancellous tissue of the long bones, which shewed no trace of medullary cavity. In the great expanse of the coracoid and pubic bones, as compared with the teleosaur or crocodiles, the gigantic saurians in question manifested their closer affinity to the enaliosauria: their essential adherence to the crocodilian type was marked by the form of the long bones of the extremities, especially the metatarsals; and, above all, by the toes being terminated by strong claws. The main organ of swimming was evidently shewn, by the strength and texture of the caudal vertebræ, to have been a broad vertical tail; and the webbed feet, probably, were used only partially in regulating the course of the swimmer, as in the puny amblyrhynchus of the Gallipagos Islands, the sole example of a saurian of marine habits at the present period. The first of these gigantic species of extinct saurians form the type of a new genus, characterised at present by the structure of its vertebræ and the form of the bones which supported the claws. These characters were given in detail, and their distinction from those of the iguanodon, megalosaurus, poikilopleuron, mosasaurus, and thaumatosaurus, was pointed out.* The remains of the reptile have hitherto been discovered only in the secondary formation called the oolite. They appear to have been first noticed in a letter from John Kingdom, Esq., read at the meeting of the Geological Society held June 3d, 1825, in which "he mentions the situation in which certain bones of a very large size, appearing to have belonged to a whale and a crocodile, were lately found completely imbedded in the oolite quarries (lower oolite), about a mile from Chipping Norton, near Chapel-House." It is principally on these bones, with others subsequently discovered and in the collection of Mr. Kingdom, that the characters of the cetiosaurus were determined. They include a portion of the tail consisting of ten vertebræ; the anterior and larger ones were five inches and a half in length, seven inches across the articular surface at each end of the body, and not less than two feet in vertical diameter, including the neural (superior) and hæmal (inferior) spines. Both articular extremities are concave, the anterior one being rather the deepest; but in this respect the cetiosaurus only slightly exceeds the teleosaurians. The articular cavities become shallower in the posterior caudal vertebræ; these gradually diminish in transverse and vertical diameter, but retain the same length, when they are reduced to two inches and one inch and a half in breadth. The body of the vertebra has no central cavity (as in poikilopleuron). The neurapophysis does not equal in antero-posterior extent the centrum, or body, of the vertebra; the disparity increasing in the posterior caudal vertebræ: the arch is placed towards the anterior end of the vertebra. The hæmapophysial arch has a more contracted base than in the iguanodon. One of the ungueal phalanges, which is subcompressed, slightly curved, and traversed on each side by a curved groove, measured five inches in length, and three and a half across its posterior part. The bone alluded to in Buckland's "Bridgewater Treatise," vol. i. p. 115, and figured in Mr. Lyell's "Elements of Geology" (1838), p. 384, is a metatarsal of the cetiosaurus. This fossil was found in the great oolite of Enstone, near Woodstock. Some large caudal vertebræ, and other bones of the cetiosaurus, have been discovered in the oolite of the neighbourhood of the town of Buckingham, and form part of Dr. Buckland's museum. Some vertebræ, an entosternal bone, a coracoid, scapula, and fragments of long bones, belonging apparently to the same skeleton, were disinterred from the middle oolite during the railway cuttings near Blisworth, and are preserved in the collection of Miss Baker of Northampton. The anterior transverse branch of the entosternum measures upwards of four feet across. The posterior caudal vertebræ, which, like those from Chipping Norton, measure five inches and a half in length, have a more hexagonal form; the lateral longitudinal ridges, and those which bound the neural and hæmal sur-

* They were the same which Professor Owen had communicated to the Geological Society, June 30th, 1841, when the name of *cetiosaurus* was proposed for the genus in question.

faces of the centrum, being more marked. They, perhaps, indicate a different species of cetiosaurus. In the museum of Professor Sedgwick, there is a caudal vertebra of the cetiosaurus from the neighbourhood of Stratford-on-Avon. The size of the fossils hitherto obtained, especially the vertebræ, if calculated according to the numbers and proportions of those of the crocodile, gives a length of forty feet to the cetiosaurus. There were next noticed some fossil remains, principally vertebræ, of another enormous saurian, which the form and texture of the vertebræ proved to be nearly allied to the cetiosaurus, but which differed in the proportions of the vertebræ. One of these —a caudal vertebra—from the Portland stone at Garsington, near Oxford, measured in antero-posterior diameter of the centrum seven inches; in transverse diameter, seven inches nine lines; in vertical diameter of the centrum, six inches. Both articular extremities of the vertebra were slightly concave; the body is slightly compressed laterally; its middle part gives a subquadrate vertical section, with the angles slightly rounded; the expanded articular ends are subcircular. A fractured dorsal or lumbar vertebra, from the same locality, with transverse processes extending obliquely backwards from the upper part of the sides of the body, measures one foot across the nearly flat articular surface. The body of a caudal vertebra of the same species, from the Portland stone at Thame, measures seven inches four lines in antero-posterior diameter; six inches six lines in transverse diameter; and seven inches eight lines in vertical diameter. The under surface is concave lengthwise, and nearly flat from side to side; it is perforated by many large vascular canals. A third caudal vertebra is somewhat shorter in antero-posterior diameter, but exceeds the preceding in vertical diameter, which is eight inches. In all these vertebræ the neurapophyses are anchylosed to the centrum, and have a smaller antero-posterior extent at their base, as in the *Cetiosaurus hypoolithicus*. In the absence of other evidence, Mr. Owen referred the gigantic saurian of the Portland stone (upper oolite) to the same genus as the one previously described from the lower oolite, and proposed to indicate it by the name of *Cetiosaurus epioolithicus*. In both species the hæmapophyses are articulated to the interspaces of two vertebræ. To this species Mr. Owen was disposed to refer a vertebra, eight inches in length of body, and nine inches in transverse diameter, from the Yorkshire oolite, at White Nab, which, together with some metatarsal bones, he had examined in the museum at Scarborough. No teeth, or fragments of jaws or cranium, have hitherto been discovered, which can be referred to either of the preceding species. The ninth section in the present Report was devoted to the description of remains of a saurian reptile of marine habits, as gigantic as the cetiosaurus, but not referable to that or any other known genus. The remains in question occur in the more recent strata, viz. those of the cretaceous group. Teeth of a large saurian, having the general character of those of the crocodile, but distinguished by the numerous and neatly defined longitudinal ridges, abruptly terminated at different lengths upon the enamel, had been described and figured by Professor Owen in his "Odontography," under the name of *Polyptychodon*. These teeth had been found not unfrequently in chalk (specimens existing in most collections of fossils), as at Barnwell (museum of Professor Sedgwick); and in Sussex, in the Folkstone gualt; and likewise in the Kentish crag-stone (lower greensand), near Maidstone. One of the specimens from the last-named locality, in the collection of Mr. Benstead of Maidstone, has a conical crown, three inches long, and one inch four lines across its base, which is circular. It consists of a body of compact dentine, partly decomposed into a series of successive lamelliform cones; but, with the exception of the iguanodon and mosasaurus, which have teeth of a different form, no parts of the skeleton of a saurian of such dimensions as might have corresponded with these teeth of the polyptychodon had been found in the cretaceous group, until the discovery by Mr. H. B. Macheson, of Hythe, of several bones of such a saurian in the greensand quarries near that town. These remains, which include ischial, iliac, and pubic bones, a femur, tibia, and fibula, and several metatarsal bones, had been originally referred to the iguanodon; but Mr. Owen pointed out the characters in the form and structure of the femur, which has no medullary cavity, by which the remains in question differ from all the terrestrial gigantic extinct saurians. No vertebræ have yet been discovered in the Hythe quarries; it remains doubtful, therefore, whether to refer the fossils in question to the mosasaurus, or to the different genus indicated by the many-ridged tooth, or to a third distinct genus, which may be found hereafter to possess peculiar dental and vertebral characters.

Mosasaurus.— Of this genus, to which the celebrated cranium from St. Peter's Mount, near Maestricht, belongs, Professor Owen had seen only a few vertebræ from the English chalk formations. Two of these form part of the Mantellian collection. They have the anterior articular facet concave, the posterior convex, and the other generic characters of the vertebræ of the mosasaurus, but have belonged to a smaller individual, or to a different species of mosasaurus.

Leiodon.—Hitherto no teeth identical with those of the *Mosasaurus Hoffmanni* have been discovered in England. The specimens which Professor Owen had found so labelled in some collections were the teeth of the pliosaurus. The only specimens which approach in form to the teeth of the mosasaurus are those from the chalk of Norfolk, described and figured in Professor Owen's "Odontography," as indicative of a new genus, for which the name *Leiodon* is there proposed. These teeth are about one half the size of the maxillary teeth of the *Mosasaurus Hoffmanni*, and differ more essentially in having their outer side as convex as the inner side, the transverse section of the crown being elliptic, the pointed extremities of the ellipse corresponding with two opposite longitudinal trenchant ridges, which separate the outer from the inner side of the tooth. The crown expands at its base, which is circular, and anchylosed to a conical process, developed from the broad alveolar margin of the jaw. In this acrodont type of dentition, the leiodon corresponds with the mosasaur. It is highly probable that its vertebræ had the same generic form; and it is possible that those from the Norfolk and Sussex chalk, hitherto referred to the mosasaurus, may appertain to the same extinct species of reptile as the teeth here described. From the correspondence in the general structure, smooth external surface, and mode of attachment of the teeth between the Maestricht mosasaur and the English leiodon, it may be concluded that the latter genus had the same affinity to the lacertian type which the mosasaur so strikingly manifests in the presence of pterygoid teeth. Having concluded the review of the British fossil reptiles belonging to the great loricate, or crocodilian, group of sauria, the Report next proceeded to the account of the extinct species which manifested in the enduring parts of their organisation an intimate relationship with the numerous and varied tribes of the smaller and lower organised saurians of the present epoch, to which the terms *Lacertians*, or *Squamate sauria*, were applied; and Professor Owen observed, that in this, as in the foregoing divisions of the saurian order, the ancient world possessed very singular, and also very gigantic, species, which have now utterly perished, and have given place to carnivorous and herbivorous quadrupeds of more active habits and a higher organisation.

Raphiosaurus.— The first fossils noticed in the eleventh section of the Report were referred to a small and hitherto undescribed genus of lacertians, from the chalk formations near Cambridge, indicated by a portion of the lower jaw, containing twenty-two close-set, awl-shaped teeth anchylosed by their bases to an outer alveolar parapet of bone, thus corresponding with the pleurodont type of dentition among the lizards. To this genus (described and figured in the last part of the "Geological Transactions") the name of *Raphiosaurus* is given. The beautiful specimen, consisting of a series of twenty dorsal, two lumbar, two sacral, and a few of the caudal vertebræ, with the pelvic bones, from the chalk near Maidstone, corresponds with the jaw of the raphiosaurus in size. The vertebral characters are strictly those of the modern lacertians; but the absence of extremities and teeth prevented the generic affinities being accurately determined.

Pleurodont Eocene Lizard.—Among the fossils obtained by Mr. Colchester from the eocene sand, underlying the Red Crag at Kyson, or Kingston, in Sussex, the existence of a lizard, about the size of the iguana, is indicated by a part of a lower jaw, armed with close-set, slender, subcylindrical, antero-posteriorly compressed teeth, attached to shallow alveoli, and with their bases protected by an external parapet of bone. The fragment of jaw is traversed by a longitudinal groove on the inside, and perforated, as in most modern lizards, by numerous vascular foramina along the outside. The teeth are hollow at their base.

Scincoid Oolite Lizards.—A small lacertian is indicated by remains discovered in the celebrated oolite at Stonesfield. The most intelligible of these is a femur, ten lines in length, having a hemispherical head supported on a short subcompressed neck, on each side of the base of which there is a strong conical trochanterian process: the middle of the shaft is cylindrical, and soon expands to form a broad distal extremity. This shape of the bone proves it not to be the young of any of the great saurians hitherto discovered at Stonesfield, but indicates its affinity to the scincoidian lizards, the largest forms of which, it is remarked, now exist in Australia, where they are associated with araucariæ and cycadeous plants, with living clarageliæ, rerebratulæ, and nigoniæ, and with the peculiar marsupial quadrupeds, the remains of all which forms of organised beings characterise the same stratum and locality as does the present extinct lacertian. Having concluded the description of the smaller and terrestrial species of lacertine sauria, the remains of which are included in slate extending from the eocene tertiary down to the oolite, Professor Owen next proceeeded to notice the more remarkable and gigantic forms of terrestrial sauria from corresponding strata, before proceeding to the description of the lacertians of the more ancient

strata, some of which have left their foot-prints in the new red sandstone. Of the gigantic lacertians in question, the most remarkable are the megalosaurus, iguanodon, and hylæosaurus—the worthy fruits of the perspicacity and research of a Buckland and a Mantell. With respect to the megalosaurus—the great carnivorous terrestrial lizard of the oolite period—the objects of the Professor's Report were reduced by the descriptions of its discoverer in his original memoir and the "Bridgewater Treatise," and by the judicious remarks of Cuvier on its natural affinities, to a brief record of the strata and localities in which the remains of the megalosaurus have been found. The chief depository of these remains was stated to be still the oolite of Stonesfield, where the original specimens were first discovered. Dr. Buckland now possesses in his valuable collection fragments of a lower jaw, containing a tooth fully developed, and many germs; an ilium, an ischium, and a femur; a series of five vertebræ, two coracoid bones, humerus, radius, metacarpal and metatarsal bones. Although the essential characters of these remains refer the megalosaurus to the lower or lacertian division of the saurian order; yet the teeth, the vertebræ, and some of the bones of the extremities, indicated its affinities to the crocodilian group. In the piece of jaw figured, the sockets, like the teeth, are compressed, separated by complete partitions, but so much wider than the teeth, as to suggest the existence of much ligamentous gum in the recent animal. There is a slight groove, or rather a ridge, along the inner side of the sockets, and it is at this groove that the apices of the new teeth protrude. Teeth which appear straight at first, are bent in progress of growth, and are serrated at both margins of the crown; but, as they grow, the anterior margin at base of the crown gets smooth and convex. Smooth surface of the tooth presents fine polished wrinkles. Now, in all existing lizards, it was stated that the teeth are anchylosed, either to the side of an outer alveolar parapet, according to the pleurodont type, or to its summit, according to the acrodont type. The double parapet, inclosing and concealing the germs and the bases of the full-grown teeth, is a remarkable approach to the crocodilian structure. The megalosaur equally deviates from the existing monitors and lizards in its vertebral characters. The femur, like the teeth and vertebræ, exhibits a mixture of the characters of the monitor and the crocodile. It is arched in two directions, being at first concave in front and then behind. Its articular head, directed forwards, has behind it a compressed and rather salient trochanter: it thickens towards the distal end, and there terminates in two unequal condyles. Near its upper third it has an expansion on both the inner and the outer side, like the one which is seen on the internal side of the femur in the crocodile. The femur of the monitor is less arched. The medullary canal is wide, which removes the megalosaur from the crocodiles, and indicates, as Dr. Buckland has well shewn, its aptitude for a more terrestrial life. Of the other localities in which the remains of the megalosaur occur, the next in importance to the Stonesfield slate is the wealden strata. Dr. Mantell has discovered in the forest of Tilgate a portion of the femur of the megalosaurus, twenty-two inches in circumference. Many teeth have been discovered altogether of the same form as those found by Dr. Buckland. Some fragments of the metacarpus and metatarsus from this locality were thicker than those of a large hippopotamus. Remains of the megalosaurus occur in the Purbeck limestone at Swanage Bay. Professor Owen had observed in some of the private collections in the town of Malton, teeth unquestionably belonging to the same species as the Stonesfield megalosaurus, from the oolite in the neighbourhood of that town. The tooth from the new red sandstone of Warwick figured in Messrs. Murchison and Strickland's Memoir, and referred to the megalosaurus, belongs to another genus of lacertian, more nearly allied to the palæosaurus of the Bristol conglomerate.

Iguanodon.—Notwithstanding the very able description and lucid figures with which Dr. Mantell had elucidated his most celebrated discovery—the iguanodon of the wealden clay, and although Cuvier had added to the value of these notices by his judicious observations, and profound knowledge of saurian anatomy, Professor Owen's examination of the numerous specimens now collected from different localities enabled him to add many additional facts in the present Report. From the name imposed on the gigantic herbivorous reptile of the wealden strata, and from the general tenor of what has been written respecting it, it is commonly supposed that it is a gigantic iguana, or a magnified representative of that diminutive vegetable-feeding reptile of the present day. But the Professor remarked that there is no existing lizard which offers such important differences in the structure of the teeth, the forms of the vertebræ, or of the long bones, in comparison with the iguana, as does the so-called iguanodon; and a very false notion would be entertained of that extinct saurian, unless these differences were duly appreciated and allowed their full value.

Iguana, it was stated, had the tooth composed of a compact dentine, as in the monitors, the true lizards, and all the other existing genera of saurians; whilst the iguanodon has a portion of the dentine complicated by the presence of numerous medullary canals. The vertebræ of the iguana had the ball and socket joint; those of the iguanodon had the anterior surface of the centrum slightly concave, and the posterior surface flat,—a very important modification which allies the iguanodon to its equally ancient and gigantic congenus, the megalosaur. The femur of the iguanodon, in the process continued from the inner side, near the upper third of the bone, deviates from all the modern lacertians, and approaches nearer the crocodiles, but surpasses them in the development of the ridge in question. A detailed description, founded upon an examination of nearly all the remains of the iguanodon yet found, was next given; and the thirteenth section of the Report concluded with a notice of all the British localities and the strata in which those remains had been found.

Hylæosaurus.—The figures and description of the beautiful fossil to which this name has been applied by its discoverer, Dr. Mantell, were stated to be amply sufficient to establish its claim to rank as a distinct genus of the lacertian division of the saurian order. Like two or three of the existing genera, the spinous processes supported each a compressed, vertical, elongated, dermal, osseous plate, the entire series forming a ridge along the back. With this character is combined the biconcave type of vertebræ so common amongst the saurians of the secondary period, with crocodilian scutæ, and a plesiosauroid scapular arch! This combination of characters being by no means the least extraordinary which this extinct species presents. A detailed description of the remains of the hylæosaurus was given, with a notice of the peculiar microscopic structure of the dermal scutæ. Hitherto, it was stated, the claim of the hylæosaurus to generic rank among the ancient saurians had rested upon the modifications of the vertebræ and their appendages; the coracoids and the dermal scutæ; no part of the head, jaws, or teeth, having been found so associated with the characteristic bones of the skeleton, as to justify a decided application of their modifications to the establishment of the characters of the genus. Teeth, however, of a peculiar form, distinct from those of every other known genus, discovered in the wealden strata, as crocodilus, plesiosaurus, megalosaurus, iguanodon, are not very uncommon in these strata. They were originally referred to Professor Jæger's Keuper species, *Phytosaurus cylindricodon*, by Dr. Mantell, and have subsequently been transferred by G. Fischer de Waldheim* to his genus rhopalodon, founded on a portion of a jaw, containing several teeth, with which those of the supposed phytosaur of the Tilgate Forest have no essential resemblance; and Professor Owen further stated that the wealden teeth in question were equally distinct from the bodies described and figured as the teeth of the *Ph. cylindricodon;* and that they belonged to a lacertian species equal in size with the hylæosaur, as indicated by the remains hitherto found, and most probably belonged to that genus. It may not be improbable, added Mr. Owen, that the compressed ungueal phalanx, conjectured by Mantell to characterise the fore-foot of his iguanodon, may likewise belong to the hylæosaur, if it be not part of the skeleton of one of the crocodilian subgenera of the wealden. The ancient lacertian reptiles, forming the types of the genera thecodon and palæosaurus, from the magnesian conglomerate near Bristol, were next noticed; and it was stated that a microscopic examination of the teeth of these genera proved them to belong to the saurian order.

Cladeiodon.—The new red sandstone of England, which has been extensively worked in Cheshire, Shropshire, Warwickshire, and other parts of the kingdom, affords scanty remains of vertebrata, and especially of reptilia; the foot-prints being the most common evidences of animals of this class. Among the detached teeth obtained from the quarries at Coton End and Cubbington were some of moderately large size; the crown being upwards of an inch in length, remarkable for its very compressed, sabre-like shape, and resembling the lacertius (palæosaurus) of the magnesian conglomerate in having trenchant and finely serrated edges. These teeth correspond with those of the palæosauri and lacertius, in general, in their microscopic structure, and indicate a distinct species, for which the name of *Cladeiodon Lloydii* was proposed.

Rhynchosaurus.—The foot-prints alluded to in the preceding section of this Report, and which appear to be common in both Keuper and Bunter divisions of the new red sandstone on the Continent and in Great Britain, have attracted much and merited attention of late years, and have given rise to many ingenious speculations. The most remarkable and most striking, from their size and peculiarity of form, are those that resemble, rudely indeed, the impression of a human hand, and to which the name of chirotherium has been given. Some of the German naturalists have described and figured other forms of footsteps differing from those of the so-called chirotherium, but sometimes occurring on the same slabs, and much more unequivocally bespeaking their reptilian

* Lettre à M. Roderick Impey Murchison, sur le Rhopalodon, 1841.

if not saurian nature. Those foot-prints, which are accompanied by the track apparently of a tail, Professor Owen supposes to have been made by the singular extinct saurian species which he described in the present section of his Report, and which was affirmed to be the type of a distinct genus, and also of a distinct family or tribe of saurians, for which the name of rhinchosaurus or rhynchosauroid was proposed. A description of the vertebræ, of certain bones of the extremities, and a detailed account of the cranium, were then given; and in reviewing the peculiarities of the skull, it was observed, than in the single, undivided, anterior, nasal aperture, bounded anteriorly and laterally by two separate intermaxillaries, and posteriorly by the nasal bones, it presented the crocodilian type. In the depth as compared with the breadth of the anterior part of the skull, some of the chelonia offered the nearest approach to the present fossil; and this affinity was more strikingly illustrated in the form of the lower jaw, the gentle convexity of its coronoid margin, combined with its imperforate character; and the slight deflection of the compressed symphynis,—a character which is exaggerated in the genus chelys. The depth and vertical position of the superior maxillary bones are characters which the rhynchosaurus possesses in common with many chelonians and lizards. If, as it seemed most probable, the jaws were edentulous, and had merely slightly dentated margins, a most striking and characteristic chelonian condition is manifested in the ancient saurian of the new red sandstone. But it was doubtful whether the actual state of the maxillary armature might not have resembled that of the agamæ and a few other lacertians, in which the dental system is very feebly developed. In the structure of the cranium, especially the long, vertical, and freely suspended tympanic pedicles, the closest and most essential affinities of the rhynchosaurus were proved to be to the lacertian sauria. Thus, it was observed, that as the ancient ichthyosaur combined in its osteological structure characters that seemed to be borrowed from the four different classes of vertebrate animals, so the more ancient rhynchosaur appeared to have combined peculiarities which are now distributed among the four orders of reptilia, the biconcave vertebræ being retained in the batrachian order; and the dawn of the reptilian class seemed to foreshadow some of the leading peculiarities of the chief groups which constitute its fully developed state. But the rhynchosaurus, like the other remarkable forms of saurians, exhibits characters which are altogether peculiar and anomalous: these are the extreme compression of the jaws, and more especially the form, the length, and the curvature of the intermaxillary bones, like the two incisors of a rodent; but the extremities of which are here prolonged, like the deflected apex of the beak of a parrot or hawk, against the compressed symphynial extremity of the lower jaw,—a conformation that must have given a most singular and striking physiognomy to the living reptile of that remote period of the history of our planet. The still more strange and anomalous reptiles provided, like the fabled dragons, with wings, and called pterodactyles, were next considered; and the species characterising the British strata, called oolite and lias, were described. Of these the most remarkable was the *Pterodactylus macronyx*, found at Lynn Regis, and now in the British Museum. The portion of jaw with teeth, supposed to have belonged to this species, was stated to appertain to some extinct scoroberoid fish. The nineteenth section of the Report was devoted to the description of the British fossil reptiles, belonging to the order cheliniæ. The grounds on which Cuvier had stated that the chelonites of Sheppey belonged to a fresh-water genus were invalidated, and three distinct species from the London clay of this locality and Harwich were described. The first by the name of *Chelonia Harviensis*; the second and third, under the names of *Chelonia breviceps* and *conirostris*, were from Sheppey Island. The species of true emys and of trionyx, from the eocene fresh-water formations of the Isle of Wight, the eocene clay at Bracklesham, and the wealden beds, were next described. Remains of a chelonian from the chalk near Maidstone, first noticed by Professor Owen in the "Geological Proceedings," were fully described and stated to form the type of a new genus (*Cimochelys*), connecting emys with chelonia, but essentially related to the latter genus. A more perfect specimen of the skeleton of this fossil turtle had been subsequently obtained by Mr. Bensted, Maidstone, in a quarry of the lower chalk at Barham, Kent, near the banks of the Medway. It includes the carapace, dorsal vertebræ, eight pairs of ribs, a border of marginal plates, some of the sternal bones, and a coracoid bone. The carapace is six inches in length, and four in breadth; the ribs are expanded and united by firmly serrated sutures along their vertebral halves only, whence they gradually taper to their marginal extremities, which are protected by the sternal or marginal plates. This extinct marine turtle has been described as a species of emys (*E. Benstedi*) by Dr. Mantell, in whose possession it now is. Lastly, the evidences of more ancient tortoises or turtles were noticed, as those which have left impressions of their footsteps in the new red sandstones of England and Scotland, and the fossil femur of a chelonian from the new red sandstone, near Elgin, was described.

Fossil Ophidians.—Not the least remarkable feature of the present Report was the account given of the remains of serpents, equalling in size the boa-constrictors of the tropical regions of the present world, in the oldest tertiary formations at the Island of Sheppey, where the remains of these ancient serpents lie buried beneath strata of the London clay of upwards of 100 feet in thickness, also in the London clay at Bracklesham, and in the eocene sand of Kyson. The anatomical character of the vertebræ was minutely described; and it was shewn that these differed from those of the modern pythons and boas, and indicate an extinct genus; the vertebræ of the palæophis from Bracklesham must have belonged to a serpent at least twenty feet in length.

Fossil Batrachians.—Of this order, represented at the present time in this country by a few species of frogs, toads, and newts, Professor Owen stated that he had discovered some remarkable representatives in the new red sandstones of Warwickshire. Some of these ancient batrachians were of gigantic size as compared with the existing forms, and offered several remarkable modifications of structure by which they approached the saurian order. Certain fossils of the same genus, found in the German Keuper, had been referred to that order under the name of *Mastodonsaurus*; these had subsequently been discovered to belong to a gigantic batrachian genus from the same formation, which Professor Owen had discovered to be characterised by a very peculiar and complicated structure of the teeth, whence he had proposed for the genus the name of labyrinthodon. This peculiar dental structure was described in detail and illustrated by diagrams. Remains of five species from the sandstone quarries (Keuper), near Warwick and Leamington, were then described, under the names of *Labyrinthodon Salamandroides*, *Lab. leptognathus*, *Lab. pachygnathus*, *L. ventricosus*, *Lab. scutulatus*. The fossils discovered at Guy's Cliff, and noticed by Dr. Buckland and Mr. Murchison in previously published memoirs, were referred to the first species, or the *Mastodonsaurus salamandroides* of Jæger.

Labyrinthodon leptognathus.—The remains which Mr. Owen considers as portion of this species, consist of fragments of the upper and lower jaws, two vertebræ, and a sternum. They were found in the sandstone quarries at Coton End, near Warwick. The portions of the upper jaw shew that the maxillary or facial division of the skull was broad, much depressed, and flattened, resembling the skull of the gigantic salamander, and of the alligator, and the outer surface of the bones was strongly sculptured, as in the crocodilian family, but of a relatively larger and coarser pattern. The fragment described contains the anterior moiety of the single row of small teeth, or thirty sockets, and the base of one of the great anterior tusks. The bases of the serial teeth project directly from the outer wall of the shallow socket, there being no alveolar ridge external to it. The large anterior fang is three times the size of the first of the serial teeth, and the size of these gradually diminishes as they are placed farther back; the length of the common-sized being about two lines, and the greatest breadth one-third of a line. The apical two-thirds of each tooth is smooth, but the basal third is fluted, and anchylosed to the outer wall of the socket. The breadth of the upper jaw, opposite the middle of the dental series, was two inches six lines. In proceeding backwards, the jaw gradually expands to three inches; and in proceeding forward narrows, but in a less degree towards the anterior extremity, and then slightly widens or inclines outwards on account of the large tusks. Where the upper jaw is entire, a portion next the median suture, four lines in breadth, is separated from the maxillary bone by a longitudinal harmonia, and corresponds with the position of the nasal bone in the crocodile. On comparing the structure of the cranium of the labyrinthodon with the batrachian condition of the same part, Mr. Owen shews that an important difference will be found to exist. In both the caducibranchiate and perennibranchiate species, the upper maxillary bones do not extend horizontally over the upper surface of the skull, but leave a very wide interval between the maxillary and nasal bones; and the palatal processes of the former contribute as little to form the floor of the nasal cavity: in the crocodiles, on the contrary, the palatal processes of the maxillary bones extend horizontally inwards, and meet at the middle line of the roof, forming an unbroken floor to the nasal cavity. In the labyrinthodon the superior maxillary bones, as already shewn, extend inwards to the nasal bone, constituting with it a continuous roof to the nasal cavities; but the palatal processes, instead of reaching to the middle line, as in the crocodiles, are very narrow, as in the batrachia. The osseous roof of the mouth is principally composed of a pair of broad and flat bones,

analogous to the divided vomer in batrachia, but of much greater relative extent, approaching, in this respect, those of the menopome, and defending the mouth with a more extensive roof of bone than exists in any lacertian reptile: "physiologically, therefore," observed Mr. Owen, "the labyrinthodon, in this part of its structure, comes nearest to the crocodile; but the structure itself, morphologically, is essentially batrachian." In the menopome and gigantic salamander, a row of small teeth extends transversely across the anterior extremity of the vomerine bones; and the occurrence in the labyrinthodon of a similar row, consisting in each palatine bone of three median small teeth and two outer larger ones, marks most strongly its batrachian nature; and from the outermost tooth a longitudinal row of small and equal-sized teeth is continued backward along the exterior margin of the palatine bone. The whole of this series of palatal teeth is nearly concentric with the maxillary teeth. In lacertine reptiles the examples of a row of palatal teeth are rare; and when it exists it is short, and situated towards the back of the palate, upon the pterygoid bones, as in the iguana and mososaur. In batrachia the most common disposition of the palatal teeth is a transverse row placed at the anterior part of the divided vomer in frogs, the menopome, and gigantic salamander, and at the posterior part in certain toads. In the amphione, on the contrary, the palatal teeth form a nearly longitudinal series along the outer margin of the palatine bones. The labyrinthodon, as already shewn, combines both these dispositions of the palatal teeth. The posterior palatine apertures are more completely circumscribed by bone than in most batrachians, occupying the same relative position as in the iguana. The posterior margin only of one of the anterior apertures is exhibited in this specimen, but from its curve Mr. Owen infers that the two apertures were not confluent, as in the crocodile, the frog, or the menopome, but that they were distinct, as in the iguana. From the physiological condition of the nasal cavity, Mr. Owen is disposed to believe that the labyrinthodon differed from the batrachia, and resembled the saurians, in having distinct posterior nasal apertures surrounded by bone, and that its mode of respiration was the same as in the higher air-breathing reptiles. In the shedding and renewal of the maxillary, the transverse palatal teeth, Mr. Owen shews that the process took place alternately in each row, as in many fishes, whereby the dental series is always kept in an efficient state. The author then described a portion sixteen inches long, of the left ramus of an under jaw, from the Warwick sandstone, which exhibited, in its structure, batrachian characters. The structure of the vertebræ and of the entosternal piece was afterwards described. All the parts of the skeleton proved the extinct animals in question to have been essentially batrachian, with affinities to the higher sauria, leading in the form of the skull and the sculpturing of the cranial bones to the crocodilean group, and in one point of dental structure, in the form of the episternum and the biconcave vertebræ to the ichthyosaurus; while in the bony palate there is a deviation from the batrachian character, and a resemblance to the lacertian type. From the absence of any trace of alveoli of reserve for the successional teeth, Mr. Owen believed the teeth were reproduced, as in many fishes, in the soft mucous membrane which covered the alveolar margin, and that they subsequently became fixed to the bone by anchylosis, as in the pike and lophius. A more striking ichthyic character is manifested in the continuation of a row of small teeth, anterior and external to the two or three larger tusks, forming a double row of teeth at that part of the lower jaw. Of the *Labyrinthodon pachygnathus*, and *Lab. scutulatus*, several bones of the extremities, with the vertebræ and dermal scutæ, were described: the latter are of a rhomboidal form, with longitudinal ridges on the outer surface; and have hitherto been found associated only with the small species (*L. scutulatus*) discovered near Leamington. But it was observed that such detached superficial bones are the most liable to be separated from the fragmentary skeleton of the fossilised individual to which they once belonged; and that the negative fact of their not having been found asssociated with the remains of the labyrinthodon in other localities, is not sufficient proof of a difference of dermal structure between the Leamington and Warwick species. If it be admitted as a generic character, it would not therefore affect the claims of the labyrinthodon to be admitted among the batrachians, notwithstanding that every known species is covered by a soft and naked skin. For the tegumentary characters are inconstant and variable as compared with those afforded by the internal skeleton, as is manifested in the chelonian order. With respect to the relation which the fossil sauroid batrachians of the German and British new red sandstone, might bear to the foot-prints of the so-called chirotherium, which characterise the same formations, Professor Owen observed that the specific difference of size in the foot-prints corresponded with the variations in the size of the different species of labyrinthodon. That both the fossils and the footsteps belonged to animals, which, like the existing tailless batrachians, had the hind-legs much larger than the fore-legs. That he had long since suspected, with some other palæontologists, that the chirotherian foot-prints were those of a batrachian reptile, and not of a marsupial mammal; but it was obvious, from their form, that the ancient batrachian must have exhibited a considerable modification of the existing types of that order. Now, observed Professor Owen, we have in the labyrinthodon, also, a batrachian reptile, differing as remarkably from all known batrachia and from every other reptile in the structure of its teeth; lastly, both the fossils and the footsteps are peculiar to the new red sandstone; and therefore he was disposed to regard the term chirotherium, as being, likewise, one of the synonyms of labyrinthodon. The Report concluded by remarks upon the general relations of the fossils described to the existing species, to each other, and to the strata in which they had been discovered. The disappearance of certain characters, and the assumption of others, as the fossil descended to deeper strata and remoter epochs, was compared with the analogous disappearance and substitution of characters in extinct fishes, established by the brilliant discoveries of Agassiz, and the same evidence was obtained in disproof of the hypothesis that older forms of organised beings had graduated into later forms, or had been in any degree their productive cause, but that the succession of distinct generic types from the ancient labyrinthodons upwards, through the ichthyosauri, plesiosauri, iguanodons, pliosauri, teleosauri, mosasauri, to the true crocodiles, could only be attributed to direct acts of the Creative Power.

The eulogies bestowed upon this paper at its conclusion were felt by all the audience to be most justly merited; and when Dr. Buckland happily characterised its author as a worthy successor of Cuvier, a general burst of applause broke from every part of the audience. Among other points briefly touched by the learned Doctor, he observed that there was one thing he must notice, which approached the marvellous—which was, that discoveries often seemed to be made precisely at the time at which they were most required. As an instance of this, he stated that just at the time Mr. Conybeare had constructed the *Plesiosaurus* from the relics found, an entire skeleton was discovered, as if to prove that he was right in his conclusions. The same thing had happened to himself when engaged in a controversy with a German philosopher as to the existence of the hyæna in England, which opinion was hardly promulgated before the innumerable bones of the animal were found in the caves of Kirkland; and now Professor Owen was enabled to prove the existence of the rhinchosaurus, an animal the most extraordinary of all others, which it was clearly shewn established a connecting link between four great families of reptiles. He congratulated the Society on the magnificent and gigantic work achieved by Professor Owen.—For the remaining business of the day, Mr. Sanders exhibited all round the room some very fine drawings of the railway sections between Bath and Bristol; Mr. Strickland exhibited some specimens of *Cardinia Agassiz;* and a paper was read by Dr. Moore, 'On the Raised Beach under Plymouth Hoe' [noticed in our last].

REVIEWS OF NEW BOOKS.

Amenities of Literature; consisting of Sketches and Characters of English Literature. By I. D'Israeli, D.C.L. F.S.A. 3 vols. 8vo. London, 1841. Moxon.

SOME of our friends think that there is rather a disproportionate share of science in our Numbers at this period of the year, when the perambulating parliament of philosophers hold their sittings and promulgate their proceedings. Well, then, let such come with us into the pleasant fields of literature, and with an old and valued companion, whose paths have ever been attended with instruction and delight. Alas! that though he is our guide, he is unable to see what causes our enjoyment.

"There is," says his preface, "one remark in which I must indulge: the author of the present work is denied the satisfaction of reading a single line of it, yet he flatters himself that he shall not trespass on the indulgence he claims for any slight inadvertences."

We would write an introduction to this most truly literary publication; but such an author as Mr. D'Israeli needs no introduction to a public which he has in former years so highly gratified by his various labours. It would be an ill compliment to him and them; and therefore we pass at once to his new work, and bid it speak for us.

It begins with an essay on Druidical Institution, which is followed by other essays on the Britons, Anglo-Saxons, the name of England, its earliest writers, from Cædmon and Beowulf to Bacon and Harrington; origin of languages dialects; travels of Mandeville and his successors; early libraries; sources of history; the spoliation of monasteries; orthography and orthoepy; the discovery of witchcraft; the first dramas; and, in short, some sixty productions all upon interesting topics, and treated in a manner which mingles research with acute o

servation, and particular inquiries with general information and applicable remark.

From so various a *conglomerate* (to borrow one of our scientific terms) it is difficult to detach a piece to elucidate the whole; but we will strike off a fragment here and there, which will help to serve that purpose, and be acceptable for their own intrinsic value.

The abandonment of Britain by the Romans is spoken of by the author in these words:—

"The tale of these ancient Britons who should have been our ancestors is told by the philosophical historian of antiquity. Under successive Roman governors they still remained divided by native factions: 'A circumstance,' observes Tacitus, 'most useful for us, among such a powerful people, where each combatting singly, all are subdued.' A century, as we have said, had not elapsed from the landing of Cæsar to the administration of Agricola. That enlightened general changed the policy of former governors; he allured the Britons from their forest-retreats and reedy roofs to partake of the pleasures of a Roman city—to dwell in houses, to erect lofty temples, and to indulge in dissolving baths. The barbarian who had scorned the Roman tongue now felt the ambition of Roman eloquence; and the painted Briton of Cæsar was enveloped in the Roman toga. Severus, in another century after Agricola, as an extraordinary evidence of his successful government, appealed to Britain.—'Even the Britons are quiet!' exclaimed the emperor. The tutelary genius of Rome through four centuries preserved Britain—even from the Britons themselves; but the Roman policy was fatal to the national character, and when the day arrived that their protector forsook them, the Britons were left among their ancient discords: for provincial jealousies, however concealed by circumstances, are never suppressed; the fire lives in its embers ready to be kindled. The island of Britain, itself not extensive, was broken into petty principalities: we are told that there were nearly two hundred kinglings, the greater part of whom did not presume to wear crowns. Sometimes they united in their jealousies of some paramount tyrant; but they raged among themselves; and the passion of Gildas has figured them as 'the Lioness of Devonshire' encountering a 'Lion's Whelp' in Dorsetshire, and 'the Bear-Baiter' trembling before his regal brother 'the Great Bull-dog.' 'These kings were not appointed by God,' exclaims the British Jeremiah; he who wrote under the name of Gildas. Thus, the Britons formed a powerless aggregate, and never a nation. The naked Irish haunted their shores, covering their sea with piracy; and the Picts rushed from their forests,—giants of the North, who, if Gildas does not exaggerate, even dragged down from their walls the amazed Britons. Such a people in their terrified councils were to be suppliants to the valour of foreigners; from that hour they were doomed to be chased from their natal soil. They invited, or they encouraged, another race to become their mercenaries or their allies. The small and the great from other shores hastened to a new dominion. Britain then became 'a field of fortune to every adventurer when nothing less than kingdoms were the prize of every fortunate commander.' We have now the history of a people whose enemies inhabited their ancient land: the flame and the sword ceaselessly devouring the soil; their dominion shrinking in space, and the people diminishing in number; victory for them was fatal as defeat. The disasters of the Britons pursued them through the despair of almost two centuries; it would have been the history of a whole people ever retreating, yet hardly in flight, had it been written. Shall we refuse on the score of their disputed antiquity the evidence of the Welsh bards? The wild grandeur of the melancholy poetry of those ancient Britons attests the reality of their story and the depth of their emotions. We have spun the last thread of our cobweb, and we know not on what point it hangs, such irreconcilable hypotheses are offered to us by our learned antiquaries, whenever they would account for the origin or the disappearance of a whole people. The mystery deepens and the confusion darkens amid contradictions and incredibilities, when the British historian contemplates in the perspective the Fata Morgana of another Britain on the opposite shores of the ancient Armorica—another Britain in La Brétagne."

Upon a point in this passage we have a single observation to offer. There is no sufficient reason assigned for the extirpation, as it were, of the Romans in Britain. Why, exactly, did they leave it? How? Were they fugitives, and those left behind massacred? There is no other instance in historical record of the conquerors and occupants of a nation having all at once retired from it, and left only the traces of their walls and roads behind. We have always been struck with this remarkable fact; and fancied that if the Britons instead of the Romans had been the historians of these times a very different tale would have been told. But we advance to their successors, the Anglo-Saxons, of whose literature it is truly stated:—

"It is now ascertained that the Anglo-Saxon manuscripts are found in a most corrupt state. This fatality was occasioned by the inattention or the unskilfulness of the calligrapher, whose task must have required a learned pen. The Anglo-Saxon verse was regulated by a puerile system of alliteration, and the rhythm depended on accentuation. Whenever the strokes, or dots, marking the accent or the pauses are omitted, or misplaced, whole sentences are thrown into confusion; compound words are disjoined, and separate words are jumbled together. 'Nouns have been mistaken for verbs, and particles for nouns.' These difficulties, arising from unskilful copyists, are infinitely increased by the genius of the Anglo-Saxon poets themselves. The tortuous inversion of their composition often leaves an ambiguous sense: their perpetual periphases; their abrupt transitions; their pompous inflations, and their elliptical style; and not less their portentous metaphorical nomenclature where a single object must be recognised by twenty denominations, not always appropriate, and too often clouded by the most remote and dark analogies*—all these have perplexed the most skilful judges, who have not only misinterpreted passages, but have even failed to comprehend the very subject of their original."

The disquisition on Cædmon and Milton is interesting, but too much for us at present; and we prefer a charming description of ancient minstrelsy:—

"There were minstrels who held honourable offices in the great households, sometimes chosen for their skill and elocution to perform the dignified service of heralds, and were in the secret confidence of their lord; these were those favourites of the castle, whose guerdon was sometimes as romantic as any incident in their own romance. No festival, public or private, but there the minstrel poet was its crowning ornament. They awakened national themes in the presence of assembled thousands at the installation of an abbot, or the reception of a bishop. Often, in the Gothic hall, they resounded some lofty 'Geste,' or some old 'Breton' lay, or with some gayer Fabliau, indulging the vein of an improvvisatore, altering the old story when wanting a new one. Delightful rhapsodists, or amusing tale-tellers, combining the poetic with the musical character, they displayed the influence of the imagination over a rude and unlettered race:

'——They tellen Tales
Both of weepying and of game.'

Chaucer has portrayed the rapture of a minstrel excited by his harp, a portrait evidently after the life,—

'Somewhat he *lisped* for his wantonness
To make the English swete upon his tonge;
And in his Harping when that he had songe,
His Eyen twinkled in his Hed aright,
As don the Sterrès on a frosty night.'

The minstrel more particularly delighted 'the Lewed,' or the people, when, sitting in their fellowship, the harper stilled their attention by some fragment of a chronicle of their fathers and their father-land. The family harper touched more personal sympathies; the ancestral honours of the baron made even the vassal proud—domestic traditions and local incidents deepened their emotions — the moralising ditty softened their mind with thought, and every county had its legend at which the heart of the native beat. Of this minstrelsy little was written down, but tradition lives through a hundred echoes, and the 'reliques of ancient English poetry,' and the minstrelsy of the Scottish Border, and some other remains, for the greater part, have been formed by so many metrical narratives and fugitive effusions. There were periods in which the minstrels were so highly favoured that they were more amply rewarded than the clergy;—a circumstance which induced Warton to observe with more truth than acuteness, that 'in this age, as in more enlightened times, the people loved better to be pleased than to be instructed.' Such was their fascination and their passion for 'Largesse!' that they were reproached with draining the treasury of a prince. It is certain that this thoughtless race have suffered from the evil eye of the monkish chroniclers, who looked on the minstrels as their rivals in sharing the prodigality

* "A striking instance how long a universal error can last, arising from one of these obscure conceits, is noticed by Mr. Grenville Pigott in his 'Manual of Scandinavian Mythology.' These warlike barbarians were long reproached that even their religion fomented an implacable hatred of their enemies; for in the future state of their paradisiacal Valhalla, their deceased heroes rejoiced at their celestial compotations, to drink out of the skulls of their enemies. A passage in the death-song of Regner Lodbrog, literally translated, is, 'Soon shall we drink out of the curved trees of the head;' which Bishop Percy translates, 'Soon, in the splendid hall of Odin, we shall drink beer out of the skulls of our enemies.' And thus also have the Danes themselves, the Germans, and the French. The original and extraordinary blunder lies with Olaus Wormius, the great Danish antiquary, to whose authority poets and historians bowed without looking further. Our grave Olaus was bewildered by this monstrous style of the Scalds, and translated this drinking bout at Valhalla according to his own fancy,—'Ex concavis crateribus craniorum;' thus turning the 'trees of the head' into a 'skull,' and the skull into a hollow cup. The Scald, however, was innocent of this barbarous invention; and, in his violent figures and disordered fancy, merely alluded to the branching horns, growing as trees, from the heads of animals—that is, the curved horns which formed their drinking-cups. If Olaus here, like Homer, nodded, something might be urged for his defence! for who is bound to understand such remote, if not absurd conceits? but I do not know that we could plead as fairly for his own interpolating fancy of 'drinking out of the skulls of their enemies.' This grave blunder became universal, and a century passed away without its being detected. It was so familiar, that Peter Pindar once said that the booksellers, like the heroes of Valhalla, drank their wine out of the skulls of authors."

of the great; yet even their monkish censors relented whenever these revellers appeared. It was a festive day among so many joyless ones when the minstrel band approached the lone monastery. Then the sweet-toned vielle, or the merry rebeck, echoed in the hermit-hearts of the slumbering inmates; vaulters came tumbling about, jugglers bewitched their eyes, and the grotesque mime, who would not be outdone by his tutored ape. Then came the stately minstrel, with his harp, borne before him by his smiling page, usually called 'the minstrel's boy.' One of the brotherhood has described the strolling troop who

> 'Walken fer and wyde,
> Her, and ther, in every syde,
> In many a diverse londe.'

The easy life of these ambulatory musicians, their ample gratuities, and certain privileges which the minstrels enjoyed both here and among our neighbours, corrupted their manners, and induced the dissipated and the reckless to claim those privileges by assuming their title. A disorderly rabble of minstrels crowded every public assembly, and haunted the private abode. At different periods the minstrels were banished the kingdom, in England and in France; but their return was rarely delayed. The people could not be made to abandon these versatile dispensers of solace amid their own monotonous cares. At different periods minstrels appear to have been persons of great wealth—a circumstance which we discover by their votive religious acts in the spirit and custom of those days. The priory of St. Bartholomew in Smithfield, in 1102, was founded by 'Rahere,' the king's minstrel, who is described as 'a pleasant-witted gentleman,' such as we may imagine a wealthy minstrel, and, moreover, 'the king's,' ever to have been.* In St. Mary's church at Beverley in Yorkshire, stands a noble column covered with figures of minstrels, inscribed 'This Pillar made the Mynstrels;' and at Paris, a chapel dedicated to St. Julian of the Minstrels was erected them, covered with figures of minstrels bearing all the instruments of music used in the middle ages, where the violin or fiddle is minutely sculptured. If, in these ages of romance and romancers, the fair sex were rarely approached without the devotion of idolatry, whenever 'the course of true love' altered—when the frail spirit loved too late and should not have loved, the punishment became more criminal than the crime; for there was more of selfish revenge and terrific malignity than of justice, when autocratical man became the executioner of his own decree. The domestic chronicles of these times exhibit such harrowing incidents as those of *La Châtelaine de Vergy*, where suddenly a scene of immolation struck through the devoted household; or that of La Dame du Fayel, who was made to eat her lover's heart. And those who had not to punish, but to put to trial, the affections of women who were in their power, had their terrible caprices, a ferocity in their barbarous loves. Year after year the Gothic lord failed to subdue the immortalised patience of Griselda, and such was our 'Childe Waters,' who put to such trials of passion, physical and mental, the maiden almost a mother. In the fourteenth century, one century later than the histories of the '*Châtelaine*' and the '*Dame*,' either the female character was sometimes utterly dissolute, or the tyranny of husbands utterly reckless, when we find that it was no uncommon circumstance that women were strangled by masked assassins, or walking by the river-side, were plunged into it. This drowning of women gave rise to a popular proverb,—'It is nothing! only a woman being drowned.' La Fontaine, probably without being aware of this allusion to a practice of the fourteenth century, has preserved the proverbial phrase in his 'La Femme Noyée,' beginning

> 'Je ne suis pas de ceux qui disent ce n'est rien,
> C'est une Femme qui se noye!'*

The personages and the manners here imperfectly sketched, constituted the domestic life of our chilvalric society from the twelfth century to the first civil wars of England. In this long interval few could read; even bishops could not always write; and the Gothic baron pleaded the privilege of a layman for not doing the one nor the other. The intellectual character of the nation can only be traced in the wandering minstrel and the haughty ecclesiastic. The minstrel mingling with all the classes of society reflected all their sympathies, and in reality was one of the people themselves; but the ecclesiastic stood apart, too sacred to be touched, while his very language was not that either of the noble or of the people."

On the origin of vernacular languages, the following is curious:—

"An ingenious literary antiquary has given us a copious vocabulary, as complete evidence of Latin words merely abbreviated by omitting their terminations, whence originated those numerous monosyllables which impoverish the French language. In the following instances the Gauls only used the first syllable for the entire word, damnum—*damn;* aureum—*or;* malum—*mal;* nudum—*nud;* amicus—*ami;* vinum—*vin;* homo—*hom,* as anciently written; curtus—*court;* sonus—*son;* bonus—*bon;* and thus many others. The nasal sound of our neighbours still prevails; thus Gracchus sinks into *Graeque;* Titus Livius is but *Tite Live;* and the historian of Alexander the Great, the dignified Quintus Curtius, is the ludicrous *Quinte Curce!—Auguis, du Génie de la Langue Françoise.* * * In this transference and transfusion of languages, Italy retained the sonorous termination of her paternal soil, and Spain did not forget the majesty of the Latin accent; lands favoured by more genial skies, and men blessed with more flexible organs. But the Gothic and the northern races barbarously abbreviated or disfigured their Latin words; to sounds so new to them they gave their own rude inflections; there is but one organ to regulate the delicacy of orthoepy—a musical and tutored ear. The Gaul, in cutting his words down, contracted a nasal sharpness; and the Northmen, in the shock of their hard, redundant consonants, lost the vowelly confluence. This vulgar or corrupt Latin, mingled with this diversity of jargons, was the vitiated mother of the sister-languages of Europe; sisters still bearing their family likeness, of the same homely origin, but of various fortunes, till some attained to the beauty and affluence of the Latin line. From the first the people themselves had dignified their spurious generation of language as Romans, or Romance, or Romaunt, still proud, perhaps, of its Roman source; but the critical Latins, themselves, had distinguished it as rustic, to indicate a base dialect used only by those who were far removed from the metropolis of the world. But when these different nations had established their separate independence, this vernacular idiom was wholly left to the people; it was the image of their own barbaric condition, unworthy of the studies, and inadequate to the genius, of any writer. The universal language maintained its pre-eminence over the particular dialect, and as the course of human events succeeded, in the overwhelming of ancient Rome another Rome shadowed the world. Ecclesiastical Rome, whence the novel faith of Christianity was now to emanate, far more potent than military Rome, perpetuated the ancient language. The clergy through the diversified realms of Europe, were held together in strict conformity, and by a common bond chained to the throne of the priesthood—one faith, one discipline, one language."

On our own mother tongue the annexed observations will be read with interest:—

"The Saxon language had been tainted by some Latin terms from the ecclesiastics, and some fashionable Normanisms from the court of the Confessor; when the Norman-French, fatal as the arrow which pierced Harold, by a single blow struck down that venerable form—and never has it arisen! And now, with all its pomp, such as it was, it lies entombed and coffined in some scanty manuscripts. We indeed triumph, that the language of our forefathers never did depart from the land since it survived among the people. What survived? It soon ceased to be a written tongue, for no one cared to cultivate an idiom no longer required and utterly contemned. After the Conquest, the miserable Saxons lost their 'book-craft.' We find nothing written but the continuation of a meagre chronicle. A few pietists still lingered in occasional homilies, and a solitary charter has been perpetuated; but the style was already changed, and, as a literary language, the Anglo-Saxon had for ever departed! It had sunk to the people, and they treated the ancient idiom after their fashion—the language of books served not simple men; laying aside its inflections, and its inversions, and its arbitrary construction, they chose a shorter and more direct conveyance of their thoughts, and only kept to a language fitted to the business of daily life. This getting free from the encumbrances of the Anglo-Saxon, we may consider formed the obscure beginnings of the English language. All the gradual changes, or the sudden innovations through more than two centuries may not be perceivable by posterity; but philologists have marked out how first the inversion was simplified, and then the inflections dropped; how the final *e* became mute, and at length was ejected; how ancient words were changed, and Norman neologisms introduced. As this English cleared itself of the nebulosity, the anomalies, and all the complex machinery of the mother idiom, a natural style was formed, very homely, for this vaunted Saxon now came from the mouths of the people,

* "Stowe's Survey by Strype, book iii. 135. We might wish to learn the authority of Stowe for ascribing this 'pleasant wit' to Rahere of the eleventh century! As the pen of venerable Stowe never moved idly, our antiquary must have had some information which is now lost. 'The king's minstrel' is also a doubtful designation: was the founder of this priory 'a king of the minstrels?' an office which the French also had, *Roy de Ménestrauls*, a governor instituted to keep order among all minstrels. Our Rahere, however 'pleasant-witted,' seems to have fallen into penance for his 'wit,' for he became the first prior.

* "Montaigne was so well acquainted with this practice, that he has used it as a familiar illustration of the obstinacy of some women—which I suppose the good man imagined could not be paralleled by instances from the masculine sex; however, his language must not be disguised by modern version. 'Celui qui forgea le conte de la femme qui, pour aucune correction de menaces et bastonnades, ne cessait d'appeler son mari, Pouilleux, et qui, précipité dans l'eau, haussoit encore, en s'étouffant, les mais et faisoit au-dessus de sa tête signe de tuer des poux, forgea un conte duquel en vérité tous les jours on voit l'image expresse de l'opiniâtreté des femmes.' The punishment of our 'Ducking-stool' for female brawlers possibly originated in this mediæval practice of throwing women into the river: but this is but an innocuous baptism, while we find the obstinate wife here, who probably spoke true enough, *s'étouffant*,—merely for correcting the filthy lubbard, her lord and master."

and from those friends of the people, the monks, who only wrote for their humble brother Saxons. The English writers, who were composing in French, and the more learned, who displayed their clerkship by their Latinity, had a standard of literature which would regulate or advance their literary workmanship; but there was no standard in the language of bondage; it had mixed, as Ritson oddly describes it, 'with one knows not what,' a disorganisation of words and idioms. Numerous dialects pervaded the land; the East and the West agreed as ill together as both did with the North and the South; and they who wrote for the people each chose the dialect of their own shire."

As our language advanced, Gower and Chaucer wrote; and we repeat a pleasant anecdote of the former:—

"This tale of Gower's free and honest satire on courts and courtiers is not yet concluded. The sphere of a poet's influence is far wider than that of his own age; and however we may now deem of this grave and ancient poet, he still found understanding admirers so late as in the reign of Charles the First. In the curious 'Conference' which took place when Charles the First visited the Marquess of Worcester, at Ragland Castle, with his court, there is the following anecdote respecting the poet Gower. The marquess was a shrewd though whimsical man, and a favourite of the king for his frankness and his love of the arts. His lordship entertained the royal guest with extraordinary magnificence. Among his rare curiosities was a sumptuous copy of Gower's volume. Charles the First usually visited the marquess after dinner. Once he found his lordship with the book of John Gower lying open, which the king said he had never before seen. 'Oh!' exclaimed the marquess, 'it is a book of books! and if your majesty had been well versed in it, it would have made you a king of kings.' 'Why so, my lord?' 'Why, here is set down how Aristotle brought up and instructed Alexander the Great in all the rudiments and principles belonging to a prince.' And under the persons of Aristotle and Alexander, the marquess read the king such a lesson that all the standers-by were amazed at his boldness. The king asked whether he had his lesson by heart, or spake out of the book? 'Sir, if you would read my heart, it may be that you might find it there; or if your majesty pleased to get it by heart, I will lend you my book.' The king accepted the offer. Some of the new-made lords fretted and bit their thumbs at certain passages in the marquess' discourse; and some protested that no man was so much for the absolute power of a king as Aristotle. The marquess told the king that he would indeed shew him one remarkable passage to that purpose, and turning to the place, read

> 'A king can kill, a king can save;
> A king can make a lord a knave;
> And of a knave, a lord also.'

On this several new-made lords slank out of the room, which the king observing, told the marquess, 'My lord, at this rate you will drive away all my nobility.' This amusing anecdote is an evidence that this ethical poet, after two centuries and a half, was not forgotten; his spirit was still vital, his volume still lay open on the library table; it afforded a pungent lesson to the courtiers of Charles the First, as it had to those of Richard the Second."

And the lines quoted: they are identical with Burns—

> "The king can make a belted knight,
> A marquess, duke, and a' that,"

only the old bard is the more pointed of the two.

Mr. D'Israeli suggests that Bunyan's "Pilgrim's Progress" may have been founded on "Piers Ploughman," which we think more than likely; and many later writers have been deeply indebted to the same prolific and curious source.

On the subject of early libraries our author is full of literary gossip:—

"There probably was a time when there existed no private libraries in the kingdom, nor any save the monastic; that of Oxford, at the close of the thirteenth century, consisted of 'a few tracts kept in chests.' In that primeval age of book-collecting, shelves were not yet required. Royalty itself seems to been destitute of a royal library. It appears, by one of our recently published records, that King John borrowed a volume from a rich abbey, and the king gave a receipt to Simon, his chancellor, for 'the book called Pliny,' which had been in the custody of the abbot and convent of Reading. 'The Romance of the History of England,' with other volumes, have also royal receipts. The king had either deposited these volumes for security with the abbot, or, what seems not improbable, had no established collection which could be deemed a library, and, as leisure or curiosity stimulated, commanded the loan of a volume. The borrowing of a volume was a serious concern in those days, and heavy was the pledge or the bond required for the loan. One of the regulations of the library of the Abbey of Croyland Ingulphus has given. It regards 'the lending of their books, as well the smaller without pictures as the larger with pictures;' any loan is forbidden under no less a penalty than that of excommunication, which might possibly be a severer punishment than the gallows. Long after this period, our English libraries are said to have been smaller than those on the Continent; and yet, one century and a half subsequently to the reign of John, the royal library of France, belonging to a monarch who loved literature, Jean le Bon, did not exceed ten volumes. In those days they had no idea of establishing a library; the few volumes which each monarch collected, at great cost, were always dispersed by gifts or bequests at their death; nothing passed to their successor but the missals, the *heurres*, and the offices of their chapels. These monarchs of the thirteenth and fourteenth centuries, amid the prevailing ignorance of the age, had not advanced in their comprehension of the uses of a permanent library beyond their great predecessor of the ninth; for Charlemagne had ordered his books to be sold after his death, and the money given to the poor. Yet among these early French kings there were several who were lovers of books, and were not insensible of the value of a studious intercourse, anxious to procure transcribers and translators. A curious fact has been recorded of St. Louis, that, during his crusade in the East, having learned that a Saracen prince employed scribes to copy the best writings of philosophy for the use of students, on his return to France he adopted the same practice, and caused the Scriptures and the works of the fathers to be transcribed from copies found in different abbeys. These volumes were deposited in a secure apartment, to which the learned might have access; and he himself passed much of his time there, occupied in his favourite study, the writings of the fathers. Charles le Sage, in 1373, had a considerable library, amounting to nine hundred volumes. He placed this collection in one of the towers of the Louvre, hence denominated the 'Tour de la Librarie;' and intrusted it to the custody of his valet-de-chambre, Gilles Mallet, constituting him his librarian. He was no common personage, for, great as was the care and ingenuity required, he drew up an inventory with his own hand of this royal library. In that early stage of book-collecting, volumes had not always titles to denote their subjects, or they contained several in one volume;* hence they are described by their outsides, their size and their shape, their coverings and their clasps. This library of Charles V. shines in extreme splendour, with its many-coloured silks and velvets, azure and vermeil, green and yellow, and its cloths of silver and of gold, each volume being distinctly described by the colour and the material of its covering. This curious document of the fourteenth century still exists. This library passed through strange vicissitudes. The volumes in the succeeding reigns were seized on, or purchased at a conqueror's price, by the Duke of Bedford, regent of France. Some he gave to his brother Humphrey, the Duke of Gloucester; and they formed a part of the rich collection which that prince presented to Oxford, there finally to be destroyed by a fanatical English mob. Others of the volumes found their way back to the Louvre, repurchased by the French at London. The glorious missal that bears the regent's name remains yet in this country, the property of a wealthy individual. Accident has preserved a few catalogues of libraries of noblemen in the fourteenth and fifteenth centuries, more pleasing than erudite. In the fourteenth century, the volumes consisted for the greater part of those romances of chivalry which so long formed the favourite reading of the noble, the dame and the damoiselle, and all the lounging damoiseaux in the baronial castle. The private libraries of the fifteenth century were restricted to some French tomes of chivalry, or to 'a merrie tale in Boccacce;' and their science advanced not beyond 'The Shepherd's Calendar,' or 'The Secrets of Albert the Great.' There was an intermixture of legendary lives of saints and apocryphal adventures of 'Notre Seigneur' in Egypt; with a volume or two of physic, and surgery, and astrology. A few catalogues of our monastic libraries still remain, and these reflect an image of the studies of the middle ages. We find versions of the Scriptures in English and Latin—a Greek or Hebrew manuscript is noted down; a commentator, a father, and some schoolmen; and a writer on the canon law, and the mediæval Christian poets who composed in Latin verse. A romance, an accidental classic, a chronicle and legends,—such are the usual contents of these monastic catalogues. But though the subjects seem various, the number of volumes was exceedingly few. Some monasteries had not more than twenty books. In such little esteem were any writings in the vernacular idiom held, that the library of Glastonbury Abbey, probably the most extensive in England, in 1248, possessed no more than four books in English, on common religious topics; and in the later days of Henry VIII., when Leland rummaged the monasteries, he did not find a greater number. The library of the monastery of Bretton, which, owing to its isolated site, was among the last dissolved, and which may have enlarged its stores with

* "The reader may form some idea of the discordant arrangement of a volume of manuscripts by the following entries:—'Un Livre qui commence de Genesis, et aussi traite des fais Julius Cesar, appelle Suetoine.'—'Un Livre en François, en un volume, qui ce commence de Genesis, et traite du fait des Romains, de la vie des SS. Pères Hermites, et de Merlin.'"

the spoils of other collections which the times offered, when it was dissolved in 1558, could only boast of having possessed one hundred and fifty distinct works. In this primitive state of book-collecting, a singular evidence of their bibliographical passion was sometimes apparent in the monastic libraries. Not deeming a written catalogue, which might not often be opened, sufficiently attractive to remind them of their lettered stores, they inscribed verses on their windows to indicate the books they possessed, and over these inscriptions they placed the portraits of the authors. Thus they could not look through their windows without being reminded of their volumes; and the very portraits of authors, illuminated by the light of heaven, might rouse the curiosity which many a barren title would repel." *

[Conclusion in our next.]

ARTS AND SCIENCES.

THE SOUTH POLAR EXPEDITION.

Happy news has been received of this interesting Expedition. The agent at Lloyd's has received the following letter from their agent at Hobart Town, of the 17th April last:—

"By the last list you will have received the return to this port of Her Majesty's ships Erebus and Terror, Captains Ross and Crozier. Nothing official has as yet transpired here, but it is generally understood that the Expedition has been very successful; and these British ships proceeded eleven degrees lower south than the Astrolabe or Zélé, and four degrees more than any other vessel has ever yet reached; that they were enabled to fix the exact position of the South Magnetic Pole at about 100 miles distant from them; and that some extraordinary mistake appears to have affected the calculations of the Americans who approached these regions."

The Hobart Town papers also contain the following announcement:—

"It is our pleasing task to announce the safe return to our port of Her Majesty's discovery ships Erebus and Terror, Captains Ross and Crozier, after a voyage of six months to the Antarctic Pole. The Expedition has been crowned with the most complete success. As soon as the season promises a chance of additional triumph, Captain Ross will again explore the Antarctic regions.

The barrier of ice which impeded their farther progress was traced for 300 miles eastward. The appearance of these inhospitable regions is represented as one continued scene of valleys of ice and mountains of snow. A discovery was made of a volcanic mountain in a desert of ice and snow, which must have been extremely strange if not terrific, and will no doubt, in England, furnish the subject of many a panoramic painting. The officers and crew are all in the enjoyment of excellent health."

The Erebus and Terror entered the main part of the ice, on their voyage of discovery towards the South Pole, on the 5th of January last, being then in lat. 66° 45′ S., and long. 174° 13′ E. On the 10th of the same month they descried land in lat. 71° 56′ S., long. 171° 17′ E.; and coming up to it on the 12th of January, they took possession of it in the name of Her Majesty. This land extends south to 79°. Proceeding onwards, a large volcano, emitting dense clouds of smoke, was observed on the 28th of January, in lat. 77° 31′ S., long. 167° 30′ E. On the 2d of February they reached to the utmost extent of their voyage, viz. lat. 78° 4′ S., and long 173° 12′ W., and were here stopped by icebergs 150 feet high, and by fields of ice which were traced as extending 300 miles to the eastward.

Although, in the course of the voyage, Captain Ross was enabled to verify the correctness of many of the spots laid down in the charts of the former, he also discovered one singular error, namely, the existence of water over a large space described as land, and which the Erebus and Terror actually sailed over for a very considerable distance, leaving the land 300 miles from the latitude laid down in the American chart. It is said that the sea in this direction abounds in seals and sperm whales. Not a single casualty occurred among the crews, and the vessels reached Hobart Town in safety, where they will remain till the season arrives for further operations.

BRITISH ASSOCIATION.

[Third notice.]

FRIDAY.

SECTION A.—*Mathematics and Physics.*
Papers and Communications.

1. Sir John Herschel's 'Report on Simultaneous Magnetical and Meteorological Observations, with Remarks, by Colonel Sabine.'
2. Colonel Sabine's 'Report of Committee on Solar Radiation on the Alps.'
3. Colonel Sabine's 'Report on Provision of Instruments for Meteorological Observations.'
4. J. Scott Russell's 'Notice Supplementary to his Report of the Committee on Waves.'
5. Professor Phillips' 'Account of New Researches on Rain, at York.'
6. Mr. Atkinson's 'Observations on Rain, at Carlisle, with Remarks, by Professor Phillips.'
7. Mr. Hopkins, 'On the Influence of Mountains on Climate.'

Colonel Sabine read the Report (No. 1) drawn up by Sir J. Herschel. The Committee consisted of Sir J. Herschel, Professor Whewell, Dr. Peacock, Professor Lloyd, and Colonel Sabine, to superintend the simultaneous observations on terrestrial magnetism and meteorology, and the Report contained the progress made. Observations for August 1840 have been received from St. Helena; for September, from Toronto; for October, from Van Diemen's Land; for March 1841, from the Cape of Good Hope; the delay at this latter place did not arise from want of exertions: from each returns now are regularly transmitted. At the portable observatories erected at Kerguelen's and Van Diemen's Land, the May and June terms were recorded; during the August term the magnetometers were hourly registered, and the reductions have been begun and are being continued. During term time three observations are regularly made at intervals of two and a half minutes; also are noted aurora discharges. The first report from Madras is dated January 1st, 1841. Accounts have reached the Committee also from Brussels, from Prague, from Cadiz, where the observatory has been completed. M. Bugoslawski's letter from Breslau to Colonel Sabine bears date July 3d, 1841. At last, it stated, the arrangements here are satisfactory, the three magnetometers have been mounted in one room. Although difficulties occurred to interrupt the progress of this result, the good cause had not suffered, not one of the material terms in 1841 has been omitted: the variations in horizontal and vertical force have been registered, and all is going on well. Lloyd's practical instructions have been followed, and the absolute declination and intensity have been obtained for the terms of August and November 1840. Accounts had been received from Norway, the instruments purchased by the Council of the Royal Society are to be fixed at Christiana; a private observatory at Havannah promises essential service. Observations are making in Russia at four places; on the 1st of January, 1841, they were all in a state of forwardness, and the results becoming more distinct. On the 12th November, 1840, the Erebus and Terror left Van Diemen's Land;* on board, and during temporary expeditions, daily observations have been made with the magnetic instruments. Magnetic surveys also have been made in sundry districts. Colonel Sabine dwelt on the importance and advantage of magnetic surveys at the present juncture; they form integral parts of the mass, and thereby the results obtained are extended from points to distance. One important survey in the British possessions in North America has been undertaken by Government. Lieutenant Younghusband had been appointed to this especial service for three years. The Master-General of the Ordnance also has added a second officer at the Cape of Good Hope, in anticipation of the survey of South Africa. For that of British Guiana, by Schomburgk, instruments have been supplied out of the grant: the portable magnetometer to be returned. Instruments have been supplied by Government to, and great advantage is expected from, the known scientific zeal of the African Expedition. Captain Caldecott, by direction of the Rajah of Trevancore, is carrying out the magnetic survey of Southern India; that of the north of India also is in contemplation. It is highly desirable that in these surveys a regular and concerted system should be followed connectedly with Professor Lloyd's instructions, which, besides their practical utility, are highly satisfactory.—The grant of 50*l.* has been exceeded by 12*l.*

Col. Sabine read a letter which he had received from Sir John Franklin, since he had been in Plymouth. It stated that Captain Ross had been less disappointed than Sir John had expected at the discoveries of the French and Americans in the high southern latitudes. He considered that they had not at all interfered with the great objects of his voyage. It was true they had discovered a little more land, but this was nothing in comparison with the great magnetical problem to be solved. Sir J. Franklin believed that Captain Ross would discover the magnetic pole or poles. He commented on his very complete mass of observations, and on his zeal and attention; nothing, he says, escapes his vigilance. In conclusion, Sir John strongly advised another expedition to the north-west passage. Colonel Sabine, before he sat down, remarked that an important point for consideration was the disposal of the transmitted term observations. Those of Breslau, and other places, may be considered those of the British Association. The two received from Breslau may be included in the next volume of "Transactions." But next year twelve would be accumulated, therefore, plates, &c. &c. would be requisite. Should the publication of the extending observations be undertaken by Government? This was a matter of anxiety to the Committee, which would be greatly lightened by advice and counsel.

Col. Sabine stated with reference to the Report (No. 2) of the Committee, consisting of himself and Sir J. Herschel, to provide two actinometers for observations on the intensity of solar radiation, to be made by Professor Agassiz at considerable heights in the Alps, for which a grant of 10*l.* had been passed at Glasgow, that the actinometers had been supplied. And with reference

* "Some of these extraordinary window-catalogues of the Monastic Library of St. Alban's were found in the cloisters and presbytery of that monastery, and are preserved in the 'Monasticon Anglicanum.'"

* See particulars of their voyage, just received, in a subsequent page.

to No. 3, which involved the provision of a good mountain barometer and thermometer for the assistance of Mr. M'Cord in his meteorological observations, for which purpose the sum of 20*l.* had been placed at the disposal of Colonel Sabine, that the barometer, but not the thermometer, had been supplied.

No. 4. Mr. Scott Russell admitted that the report of the Committee 'On Waves' last year was considered final. It contained, however, one or two doubtful results. Since the last meeting he had had an opportunity of repeating his experiments on a large scale, and he asked to be allowed to submit his present communication as an appendix. By enlarging the triangular channel, and by diminishing the angle at the base, cutting off from the bottom about one and a half inches, and making the proportions of the channel six feet wide and two feet deep, he had propagated therein a beautiful and perfect wave, and obtained results so decided as to leave no ambiguities. The difference between experiment and theory, as propounded by Professor Kelland, was small before; but now that experiment had been made on a sufficiently large scale, the velocity of a wave in a triangular channel has been fully established. Another circumstance had arisen from the employment of the larger channel, and had assumed importance. Mr. Russell was desirous to ascertain whether it were possible to generate a negative wave possessing the same character as the positive wave. The positive was generated by the addition of water to the end of the channel; the negative, by lifting up water from the end of the channel. This latter moves also with uniform velocity, is reflected just as the positive; the anterior portion of it is of the same shape as that of the positive, and is propagated with a velocity due to the depth of the lowest part of the wave. The new feature is this:—The positive wave, coming into stagnant water, moves the particles of the water a certain distance and leaves them; but not so the negative, which is never generated without secondary waves. It is always attended by oscillatory waves in an infinite series; lessening in height, and becoming shorter, the farther they are from the negative wave—diminishing in length, in height, and in shape, until they become infinitely small. The relation existing between these waves offers a curious result. All oscillatory waves meeting each other, cross without interference; but the negative and positive, nearly exactly equal, meeting, neutralise each other, leaving only residual waves (in case of inequality, we presume), which appear to consist of oscillatory waves. The result then is that, first, opposites meeting, the two waves are extinguished for ever; and secondly, the apparent impossibility of producing a negative wave to leave the particles of water in the same state it found them. Another subject was worthy of being mentioned in relation to the resistance of water to the propulsion of vessels. Without a diagram, however, we cannot represent the curves of resistances, nor clearly shew how the resistance is much greater at velocities less than that of the wave, and much less at velocities greater than the wave. This was established before the last Report; but there was one point omitted, and that was, as to a varying velocity and a varying depth. The omission will now be supplied in the Appendix to the Report. The result of the experiments is, that at infinite depths and great velocities, the difference between velocity and resistance becomes smaller and smaller.

Professor Whewell made a few observations on the results in this communication and of the former occasion—their great interest and the addition to our knowledge of the subject; and referred to the tide wave in the Frith of Forth, the phenomena of which Professor Airy had been engaged in explaining theoretically. The tides of the Forth are peculiar. [This, doubtless, many of our readers will remember.] In some parts there occur four tides in the twenty-four hours. The explanation seemed to be this, that two tide waves, of different velocities, arrive at the mouth of the Frith, the one from the north, and the other from the south and eastern parts of the English coast, and separating there, proceed up the Forth, and produce apparently two tides instead of one. This, however, is embarrassed with difficulties, and theory says that these two waves coming together would go up together, and, according to Professor Airy, neither pass by the other. But if the height of the wave varies in small proportion to the depth, then the wave will undergo changes in form, the outline be altered, and a single summit broken into two and even three. This, Professor Whewell said, appeared to him to be the explanation. He had recently received it from the Astronomer Royal, in a brief letter, which also contained the precise formula. It must be satisfactory thus to see theory and experiment go hand in hand. In conclusion, he asked Mr. Russell whether he was aware that the fact of two tides in the Frith, had been published in the "Philosophical Transactions" a hundred years ago?

Mr. Russell replied that that was not known to him, but he had heard that the phenomenon had been noticed many years ago. The fact is universally known among the fishermen as leaking tides, as though one had leaked from the other.

Professor Phillips then brought before the Section 'An Account of new Researches on Rain at York, and Observations on Rain at Carlisle.' Mr. Hopkins' communication was illustrated by a diagram, and had principal reference to the effect of a ridge of mountains on tropical currents, and generally to the sources of variety in climate.

SECTION B.—*Chemistry and Mineralogy.*
Papers and Communications.

1. 'On some Instances of Restrained Chemical Action,' by Mr. Parnell.
2. 'On some Subjects connected with the Sulphocyanides,' by Mr. Parnell.
3. 'On Manures, considered as Stimulants to Vegetation,' by Dr. Daubeny.
4. 'On the direct Formation of Cyanogen from its Elements,' by Mr. Fownes; read by Mr. Parnell.

The papers in the Chemical Section of this day referred to points in experimental chemistry of some interest, but neither very important nor very new. The communication by Dr. Daubeny on an agricultural subject is, however, so useful a companion to that 'On the Midge in Wheat,' by Professor Henslow (*see our last No.*), that we have much satisfaction in giving a brief but correct abstract of it.

'On Manures, considered as Stimulants to Vegetation.' In this paper the author discussed the question as to the sense in which manures may be regarded in the light of stimulants to plants. It is evident that if the term stimulus be understood in an acceptation similar to that in which it is employed with reference to the animal economy, it ought to be confined to bodies which by their presence assist in promoting the secretion and assimilation of the nutritious matters present, and ought not to include such as themselves afford the materials for the plant to feed upon. Thus common salt and other condiments are accounted stimulants to digestion, because, without being nutritious themselves, they, by their presence, cause the food to be assimilated more readily. Now, it becomes a fit subject for inquiry, whether manures operate in the former way or in the latter, and likewise whether the fact that certain of them act less beneficially at subsequent periods of their application than they do at first, is to be explained on the recognised principle "that stimuli lose their full effect upon living matter on repetition." Dr. Daubeny adduced several facts which led him to infer that the nitrates of soda and of potass operate favourably on certain crops, by communicating to them *nitrogen;* and that the reason why these salts sometimes appear to lose their influence when repeated, and even to leave the land in a worse condition than before, is not from their being stimuli, and, as such, amenable to the law above alluded to, but because the free supply of nitrogen, afforded by the decomposition of the nitrates, would cause the plant to absorb a larger portion of those other ingredients, such as phosphate of lime, silicate of potass, &c., which are present in only a limited quantity in the soil: thus tending to exhaust it of these materials, and causing thereby a worse crop to take place the year following. Now, though it may be true that the nitrates, considered in the above point of view, act in some sense indirectly as stimuli, yet it was conceived that the term itself had better be abandoned, as its adoption might lead to an erroneous impression in the mind of the farmer with respect to the proper mode of restoring to the land its original fertility. If the theory suggested by the author be the true one, it will follow that the proper remedy would be, not to discontinue the use of the nitrates, but to restore to the land, by the application of bone-manure, &c., at intermediate periods, those other ingredients which had been abstracted from it in too large a quantity. In order to determine what materials are wanting, and in what proportions to apply them, independently of the empirical plan of ascertaining by repeated trials the substances which best succeed in remedying the deficiency, two methods suggest themselves. The first, a difficult one, is to learn, by a minute analysis of the soil, whether all the ingredients which the crop requires are actually present in it, so as to take care that they should possess qualities equivalent to those which would be contained in the intended crop. The second, a more practical one, is to calculate how much of each substance had been abstracted by every crop taken off the ground, and to add an equivalent quality in the shape of manure. The Professor suggested that a kind of book-keeping on this principle should be undertaken on each farming establishment, in which a debtor and creditor account might be made out, of the nitrogen, the earthy phosphates, the alkali, &c., abstracted as crop, and restored as manure each year; and concluded by directing attention to certain points which require further investigation with reference to this part of the subject. The first of these is, whether nitrates, when introduced as manure, actually diminish in quantity and finally disappear after successive crops have been grown upon land impregnated with them. The second is, whether common salt acts as food or as a stimulant to vegetables. The third is, the exact composition of all the several crops cultivated by the farmer, as well as of all the manures he employs, so that he may know exactly the amount of alkaline and earthy salts, as well as of nitrogen, present in each of them.

The desultory conversation that ensued embraced questions and answers, theoretical and practical, highly interesting and important, inasmuch as the facts elicited thereby may be hereafter applied to the improvement of agriculture. The general impression appeared to be that great advantages are to be derived from satisfactory analyses (on a large scale) of soils. These were recommended to be made extensively. And with reference to the use of the nitrates as manures, the principal object to be ascertained is whether or not the nitric acid be decomposed.

The title of paper No. 4, by Mr. Fownes, 'On the direct Formation of Cyanogen from its Elements,' held forth no promise of connexion with the foregoing. However, in detailing the careful experiments conducted for the above expressed object, it appeared that nitrogen in contact with carbon was condensed and combined with it. Hitherto, from the conceived repulsion, as it were, of nitrogen to bodies other than oxygen and hydrogen, it was thought that the presence of nitrogen in vegetation was due mainly to ammonia. The facts described in Mr. Fownes's experiments shew the tendency of nitrogen to unite with carbon, if a material be present to compress the particles of the nitrogen, and may change the views of theoretical agriculturists as to its source to plants. Dr. Daubeny readily caught at this novel relation, and promised it his immediate and earnest attention.

SECTION C.—*Geology and Physical Geography.*

Papers and Communications.

1. Mr. Jordan, 'On the Best Mode of taking Electrotype Casts of Fossils.'
2. Mr. Bartlett, 'On the Post-tertiary Formations of Devon and Cornwall.'
3. Dr. Buckland, 'In Explanation of Mr. Sopwith's Models of Geological Faults and Sections.'
4. Mr. Peach, 'On the Organic Remains of the South-east Coast of Cornwall.'
5. Rev. D. Williams, 'On Stratified and Unstratified Volcanic Products in the Neighbourhood of Plymouth.'

Mr. Bartlett's paper consisted of a description of the post-tertiary formation in Devon and Cornwall, a great portion of which was formed from the disintegrated material at Dartmoor.

The President recapitulated the points of the paper, after which a discussion took place between Mr. Austin, Professor Sedgwick (who made some interesting remarks on the raised beaches of Devon and Cornwall, and their organic remains), and Dr. Buckland, who explained some osseous remains brought from the Limestone Cavern of Berry Head; among which he pointed out two human bones, a femor and tibia. Some of the bones, he thought, had dropped in, as cases of that kind often occurred; some caves, however, had also been inhabited, bones were afterwards carried in, and such places were also frequently used as sepulchres and places of burial. He explained the action of water in corroding the substance of the rock into hollows, and stated the various speculations that had been formed as to these osseous remains, whether they had been carried in, or more probably fallen in through lateral chasms, which were afterwards filled up by stalactites. He alluded to the animal remains found in the Oreston caverns, describing the appearance the excavation presented when he entered the cavern, where the bones of hyenas and other animals not now found in this hemisphere were deposited in great quantities. He thought some of these appearances favoured the theory of a period of cold having at some time followed a period of heat, when these creatures were basking in warmth and sunshine. He thought it probable that the bones might have drifted down the valley of the Plym, and worked their way from the estuary into the cavern where they were found. In a subsequent part of the discussion Dr. Buckland combated the notion that, because human remains were found among the bones of the geological period, it was to be supposed that those human beings were contemporary with them. He ascribed it to interment, stating that the bones of elephants and hyenas, and other animals, were frequently dug up in making graves in the churchyards of Dorsetshire and other localities. He also gave an amusing account of a cave in Wales, in which he had found the skeleton of a female who had been buried among fossil remains, and who had evidently kept a sort of suttler's shop, as appeared from the remains of Celtic implements of gambling, and other amusements of a camp.

During the interval between the first and second paper, Dr. Buckingham explained the construction of the model of the coal field of the Forest of Dean, of the coal fields of the north of England, as well as of the lead mines of the mineral districts. He explained the great utility and advantage of models of mines over drawings.

Mr. Peach then read a paper 'On the Organic Remains of the South-east Coast of Cornwall.' The paper was illustrated by drawings of enchrinites and other fossils found in the district described. Cornwall had been supposed not to be so rich in fossil remains.

Professor Phillips explained the nature and value of a number of fossils which were laid before the Section; and his observations were followed up by some remarks from Mr. Williams.

Mr. Williams read his paper 'On Stratified and Unstratified Volcanic Products in the Neighbourhood of Plymouth,' which contained some further particulars of the elvan dykes alluded to by the President. The paper was illustrated by diagrams. It was followed by some observations from Professor Sedgwick, on the disturbances of granite and other rocks by these remarkable dykes.

SECTION D.—*Zoology and Botany.*

Papers and Communications.

1. Dr. Hodgkin, 'On the Distribution of Queries on the Human Race,' proposed by a Committee of the Section, and containing Observations and Suggestions relating to the Study of Ethnography.
2. Capt. Widdrington, R.N. 'On the Eel, and on the Fresh-water Fish of Austria.'
3. Mr. Ball, 'Apparent Instance of Vegetable Life destroyed by Animal Odour.'
4. Mr. Forbes, 'On Two Remarkable Marine Invertebrate Animals inhabiting the Sea.'
5. Mr. Patterson, 'On Natural History as a Branch of Education.'
6. Mr. J. E. Gray, 'On a New Glirine Animal from Mexico.'

Dr. Hodgkin animadverted on the importance of inquiries into the state and condition of man, which seemed to have been neglected and overlooked by philosophy, whilst it bestowed all its attention on comparatively minute and trivial investigations, such as the shape of a plant, or the construction of a butterfly or beetle. His communication followed up that of Mr. Pritchard at Bristol, but seemed to be chiefly turned towards the projects of the Aborigines Society and the protection of the natives of New Zealand.

An interesting conversation ensued on the subject of savage dialects.

The Secretary read Captain Widdrington's paper 'On the Eel and Fresh-water Fish of Austria.' The susceptibility of the eel to cold had been assigned as the cause of its not being found in the upper branches of the Danube; but he ascribed it to the nature of the Alpine waters, which contained no food, and ran with so rapid a current as to be uninhabitable by the eel. Where such torrents descended from mountains they were generally deficient in this respect, and it was seen that the same circumstances attended the Rhine; whilst the Elbe, free from Alpine streams, contained abundance of the fish. Germany was, however, one of the richest countries in the world for ichthyology. He had found seven species of sturgeons, and one quite new in the Danube, and recommended the general study of this science in particular, with reference to the fresh-water specimens there and in other rivers.

Mr. Couch having been appealed to, said he had little to add to what Mr. Yarell had published. The eel always descended to the ocean if it could, to deposit its spawn; but if prevented it sought any possible situation, even in hard ground or damp ground, which afterwards became hard. At first, it was perfectly transparent, and the opaqueness began at the tail. It crossed meadows and devoured slugs; as an instance of the former, he had heard of one caught in a bird-trap. Millions of them climbed rocks, and they could ascend the spouts of houses whenever there was water to sustain their motion. He also noticed the force of their prehensile tails—so strong, that if they could once get any hold of a material, their efforts to escape from captivity were quite astonishing. Their bites, too, were severe, being performed with a rotatory motion of the head; and during thunder their habit was to leave their shelter in mud, or banks, or bottom of the river.

Some other curious facts relating to various fish were afterwards mentioned in the conversation which ensued. The poison in whiting (we believe, or some fish like it) caught at Jamaica, was described to be instantaneously fatal to human life; and the roe of the same fish in our own seas had been found, under certain circumstances, to be peculiarly dangerous. It was stated that pilchards (owing to temperature and its desire of warmth) spawned in deep water in winter, and in shallow water in spring.

Another striking observation was made, namely, that the luminous appearance of the sea often proceeded from prodigious masses of spawn floating on its surface. This "foul-water," as it was called, was of an oily nature, and being decomposed by the heat of the sun, the creature was disengaged and sunk into its natural element.

Congers, it had been ascertained, saw well at sixty fathoms depth in daylight; one of ninety-eight pounds was mentioned, and a common eel weighing twenty-six pounds.

Mr. Ball's communication merely described the effect produced by the odour of a young porpoise upon some plants in a greenhouse, where he had deposited it in order to have the soft parts cleaned off by the maggots of the blue flesh-fly. Their leaves were turned red and yellow,—flowers and a bramble died,—and the others seemed as if dipped in boiling water. The odour was of a fatty character; but he was not clear that the effect might not be produced by the fornice and of the maggots.

Mr. Forbes described two remarkable marine invertebrate animals inhabiting the Ægean Sea.

Mr. Patterson read a paper 'On Natural History as a Branch of Education.'

Mr. J. E. Gray described a new glirine animal, lately received from Mexico. It appeared from various characteristics to be the representative of the genus *Jerboa*, which is confined to the western parts of Africa, and

was a remarkable instance in the geographical range of animals.

SECTION E.—*Medical Science.*
Papers and Communications.—Nil.

GENERAL MEETING.
Town Hall, Devonport.

PROFESSOR WHEWELL's (the President) address on taking the chair, being a distinct portion of the annual history of the British Association, we subjoin a report of its substance. The learned Professor set out by some personal remarks on his election to the Presidency, and circumstances connected with it; and on his eligibility to undertake the duties of that high station, chiefly resting on his constant attendance, regard for the Institution, and having filled all the subordinate offices with zeal and assiduity. He then entered upon a luminous view of the general position of the Association, and spoke as follows:—

"Those of you who are acquainted with the writings of the greatest of our philosophers, are aware that several of them who have contemplated the past progress and future prospects of science in that spirit of comprehensive thought and large hope, which the subject so strongly calls for, have imagined some vast institution, by which the advance of science should be systematically and powerfully aided;—some great Philosophical College, which should have for its business, not to teach mainly, but to make discoveries—to extend our knowledge of every part of nature by all the appliances which experiment and theory, observation and calculation, ingenuity and perseverance, can supply; and in addition to these, by more material resources, money and a multitude of fellow-labourers. You recollect, perhaps, the great Bacon's remarkable picture of the 'New Atlantis.' The imaginary teacher, whom he introduces as one of the sages of this Utopian region, describes to the inquiring traveller an institution which he calls Solomon's House, and which is such a college for making discoveries as we have just spoken of. Of this institution, he says, 'The end of our foundation is the knowledge of causes and secret motions of things, and the enlarging the bounds of the human empire to effecting of things possible.' As parts of this house, there are described caves and wells, chambers and towers, baths and gardens, parks and pools, dispensatories and furnaces, and many other provisions for experiment and observation. There are also many classes of persons who conduct the business of this college, and whom, according to their employments, he calls by somewhat fanciful names—merchants of light; mystery men; depredators; pioneers, or miners; compilers; dowry men, or benefactors; lamps; inoculators; and finally, interpreters of nature, who elevate the truth of experiment into general laws, the highest forms of human knowledge. Other philosophical writers have presented, in various ways, somewhat of the same conceptions. But, you will perhaps say, all this is mere imagination. Such an institution exists only in Utopia: it was never contemplated as a reality. True: it is ideal, just as all the highest forms of human institutions are ideal. It is Utopian, just as a perfect monarchy, perfectly administered, is Utopian. But if we conceive a perfect monarchy, where the sovereign has unlimited power, which he exercises with entire wisdom and justice, while the resources of the state are ample, and the character of the nation is intellectual and progressive, must we not, in such an Utopia, include also the notion of such a college of discovery? Beyond all doubt, if we imagine to ourselves a 'New Atlantis,' we must also place in it a Solomon's House. Still, you will say, all is imaginary—and to what use do we feed our minds with these empty pictures of unattainable good? To what use, do you ask? Some of you, well aware that, in the constitution of man, imagination and hope,—the boldest imagination, the loftiest hope,—are not without their use—aware what use is, have already answered this question in your own hearts. Of what use are the ideal pictures of objects that tend to elevate and improve the condition of man? Of that use, which, if we disregard, the condition of man forthwith becomes degraded, and his prospects a blank. They are of use in raising our thoughts and stimulating our exertions, so that we may become wiser, and better, and nobler than we are? Is this a new doctrine? God be thanked, in this country at least, it has long been familiar to men's minds—has been practically acted upon, and has been attended with the most blessed and glorious effects. Let us look to other objects, very different from the increase of knowledge, and we shall easily discern the operation of this doctrine. It is not difficult to see in what form we may expect to find it shewing itself. For if we imagine this Utopia of a perfect government, Solomon's House will not be the only ideal institution there. In such a land of justice, and wisdom, and religion, we shall have colleges for diffusing justice, and wisdom, and religion over the face of the earth. We shall have a college for teaching the poor, a college for repressing the vicious, a college for the abolition of slavery, a college for diffusing Christianity over the face of the globe. Such colleges we should have in our Utopia—but Utopia is not. What then? do we therefore despair of these great objects? Do we sigh to think that all this contemplated good is mere imagination? Do we lament that we are not in an absolute monarchy, where the wisdom of the sovereign, supported by unlimited power, might call into existence those beneficial institutions? Do we despair of these great and good objects, because we live in a state of society where men act each for himself, unforced by supreme power? Do we cast away our ideas, because we are not likely to be carried towards their realisation by the whole power of the state? Do we do this; or do we not do something very different? Something very different indeed we do. We still keep our thoughts fastened upon our ideas of what is highest and best; but feeling that we are free, and that it is our glorious privilege to act as freemen, we attempt to realise our ideas, not by the power of the state, but by that power which, in such a state and on such subjects, represents the conviction of the nation, the power of voluntary association. We have had thus,—not state colleges but voluntary societies, for Christianising the heathen, for teaching the ignorant, for repressing the vicious; and we had a voluntary Society for the Abolition of Slavery, till the principle of voluntary association, in that instance, thank God! performed its work even to the end, by inducing the state to take up and carry into effect the great object which had been the aim of the voluntary society from its foundation. What, then, is the conclusion to which we are led, by looking at the spirit of our country, as shewn in its most strenuous exertions and most glorious acts, and combining this view with the loftiest ideal aspirations of the greatest philosophers the land and the world have produced? What but this: that with regard to that institution, which has for its object to extend the bounds of human knowledge, we must realise the idea in the same manner as we endeavour to realise other ideas in our practice;—that what in a perfect monarchy would be done by a wise sovereign, we must do by voluntary exertion;—that in the place of a Solomon's House supported by the State, we must have a British Association supported by ourselves. The British Association has now for ten years discharged the office of such an institution as we have spoken of. Considerable funds, raised by the contributions of its members, and expended under its direction, have been employed in furthering and verifying discoveries. It is true that we have not attempted to erect such edifices, and to make such preparations for the purpose of experiment, as Bacon introduces into his picture; but we have attained the same end more effectually, by procuring the use of many of the great establishments of manufacture and commerce which this empire possesses. We have had experiments carried on at furnaces and iron works, on railroads and canals, in mines and harbours, with steam-engines and steam-vessels, upon a scale which no institution, however great, could hope to reach; but which has been placed in our power by the enlightened liberality and scientific zeal of the proprietors and directors of such means of research. We have not had various bodies of professors of the art of discovery employed in these inquiries—we have not attempted to form classes of mystery men and dowry men—collectors of facts and interpreters of nature;—but we have found the most gifted and eminent cultivators of science in our own country, and several of those of other countries, ready and willing to undertake for us the office of exploring and interpreting nature—of extending and applying art. No institution, however formed, could have hoped to collect, as its active members, such a body of philosophers as have gladly come forward to labour for us, and have freely given us the resources of their vast powers and matured skill. Mathematicians, and astronomers, and geologists, and chemists, and naturalists, illustrious through Europe, have superintended the execution of our commissions with as much care as their own most favourite researches; and we have seen a co-operation of experimentors and calculators, observers and generalisers, such as might satisfy the wishes of Bacon himself. That I may not dwell on mere generalities, I will mention a few of the sums expended by the Association upon scientific researches; which, when it is understood that they have been spent under the direction and vigilant control of such men as I have spoken of, will shew the amount of service which has been rendered to science by that body. In the first three years, the sums thus expended were small, the Association having been mainly employed in collecting information which might direct its future proceedings. In the fourth year 167*l.* was thus spent, and from this time the sum went on rapidly increasing.- In the fifth year it was nearly 500*l.*; in the sixth and seventh nearly 1000*l.* each year; in the eighth and ninth, above 1500*l.* each year; and it appears that during the past year we have expended in this manner the sum of 1240*l.* And these sums, it is to be observed, are only a part of what were voted; at Liverpool, in 1837, above 3000*l.* was voted, of which 1000*l.* only was applied for; at Newcastle, 3700*l.* was voted, and 1600*l.* of this only

paid; at Birmingham, 2800*l.* was voted, and 1500*l.* paid; the sum voted at Glasgow last year was 2600*l.*, of which, as I have said, your treasurer has really paid 1240*l.* These differences of the sums voted and paid in each year are evidence of the care with which the resources of the Association are husbanded; for the sums voted were to be had on application made by the persons to whom their disposal was intrusted; but they were not applied for, except in proportion to the scientific work which was done; and those who undertook these labours for us carefully confined their expenditure within the narrowest possible limits. It would occupy you too long if I were to mention in detail the subjects to which these sums have been applied; but I may state in general, that above 900*l.* has been expended by us in the furtherance of astronomy, mainly upon the object of reducing observations already made into such a form that they can be directly compared with the theory. Above 800*l.* has been expended on tide observations; 250*l.* on experiments on waves; 500*l.* on experiments on the best form of vessels; 200*l.* on experiments on cast-iron; about 400*l.* has been employed in various labours relative to meteorology; and above 300*l.* on the description of fossil fishes and reptiles.* I shall not detain you by mentioning smaller sums which have been devoted to various objects; but I may call to your notice a work executed mainly in this county, upon which the Association expended about 550*l.* in 1838 and 1839. This work consisted in striking a level line from the north coast of Somersetshire to Exmouth, in order to determine whether the level of the sea is the same in the Bristol Channel and in the British Channel, and in order to afford a standard of reference in future times, if, from any cause the relative level of the land and the sea should change. This operation has already afforded us the means of determining that the great land slip, which has recently taken place near Axmouth, was not accompanied by any permanent change in the level of the land itself, where a block of granite lies, which marks one of the extremities of our level line. Since the first institution of the Association, about 7000*l.* has been expended on such objects as I have pointed out; but it is impossible for any one who knows the nature of scientific researches, and the difference between the result of money expended in experiments by a good and a bad philosopher, to doubt that this sum has produced effects which many times the sum applied without the same advantages could not have obtained. Without the encouragement of the Association, these researches would never have been undertaken; without the aid of such men as have frequented the meetings of the Association, they would have been attempted to no purpose. It has been said of certain parts of Europe that they afford—

'Iron and men, the soldier and his sword;'

in like manner we may say of this Association, that it has supplied at the same time the philosophical soldier and the weapons with which he gains his victories over Nature. But further, besides the expenditure of its own funds, the Association has been the means of procuring the appropriation of very large sums to scientific purposes from the national resources. At the suggestion or request of their body, the reduction of the observations of the planets made at Greenwich from the time of Bradley has been completed; and the reduction of the observations of the moon has been begun. Up to the present time, about 2200*l.* has been expended in all. And by a letter from the Astronomer Royal, received since I came here, I am informed that, within a few weeks, the Government expressed great willingness to advance more money for this purpose; and Mr. Airy adds, that next Monday he is to have twelve calculators employed upon the work. We have applied to the Government for the extension of the ordnance survey into Scotland, and have received a favourable answer. We have tendered our advice that the ordnance survey of England shall in future be conducted on a scale of six inches to a mile instead of two inches, and this advice is already acted on in the northern counties of England, where the survey is now proceeding. Above all, I must mention an undertaking, entered upon in pursuance of our repeated recommendations (a service which the philosophers of future ages will duly estimate), the great magnetical survey of the terrestrial globe, by the combined operation of a naval expedition and fixed observatories in every quarter of the world, which is now carrying into effect,—a scientific work, this, far surpassing in the scale of its means, and in the completeness of its design, any ever yet attempted, and such as Bacon might have assigned to the sages of his New Atlantis, if he had, in imagination, extended their polity from the Atlantic to the Pacific, and from pole to pole."* The Professor next complimented the Government for its liberality and spirit in aiding all the objects recommended by the Association and in conjunction with it; and proceeded to point out how its labours might be successfully prosecuted, and its character upheld by the present meeting. The waves, the winds, and all animate and inanimate nature, were open for their researches; and he particularly alluded to magnetism as offering a most interesting field for experiment and investigation. "On the present occasion, a distinguished Belgian philosopher, one of our corresponding members (M. Quetelet), comes to us to invite us to take a part in determining, by extensive observations, the changes which atmospheric conditions produce in periodical phenomena,—such as the times of the leafing and flowering of plants, of the arrival of birds, and the like. He has obtained extensive co-operation in his own country, and no doubt will find fellow-labourers in ours. Meteorology, in its largest sense, is a subject, which, although great collections of observations have been made, is hardly yet a science: yet the interpreters of this part of the book of nature have already begun to spell out some phrases, which shew that the language is not wholly unintelligible; and here, therefore, we may go on hopefully, recollecting always that the collection of facts is a matter of comparatively small value, except we can also trace in them some rule or order. The mere gathering of raw facts may be compared to the gathering of the cotton from the tree. The separate filaments must be drawn into a connected thread, and the threads woven into an ample web, before it can form the drapery of science. We ought to have meteorological observations and observers distributed over the face of the globe: and even this would not be enough; for we wish to know not only what passes on the earth's surface, but through the whole depth of the atmosphere; hence it would be desirable to have observations made at elevated points free from the action of the ground—such as can only be obtained by the aid of balloons. Such an undertaking has been under the consideration of a committee during the past year, and a report on the subject has come before the Physical Section. I trust that on this subject you will soon hear more. As other subjects on which we still want facts—that is, numerous and systematical collections of facts, and laws deduced from facts—I may mention the tides of the Pacific, the velocity of sea-waves, and subterraneous temperature. Another class of inquiries well fitted for our labours, is the determination of the fundamental elements, or constants, of operations of engineering, as the constants of railroads, steam-engines, and other works of art, which form part of the wealth and resources of this great empire. These are already under investigation. The addition of a Section of Practical Mechanics and Engineering to the previous constitution of the Association, which took place at Bristol, shewed the interest which such inquiries inspire; and various committees have collected much valuable information of this kind, and will, we trust, collect much more. There is also another Section of the Association, added to its plan at Cambridge, which has for its object researches of a highly interesting kind,—I mean the Section of Statistics; and we trust that there is ample employment for this Section, in subjects which can be dealt with in the same calm speculative spirit as the other sciences which we here cultivate." The learned Professor proceeded to read the Statistical Section a smart lecture on the discussions to which it should confine itself, and the mode of carrying them on. He told the members of it in round terms. "The pursuit of scientific truth is, no doubt, a means of indirectly elevating man's intellectual and social condition; but we assemble in order to promote the direct pursuit of scientific truth; and we must not turn aside into the more wide and tangled paths of those who make its collateral effects their main object. Knowledge is power, we are told. Knowledge *is* power; but for us, it is to be dealt with as the power of interpreting Nature and using her forces; not as the power of exciting the feelings of mankind, and providing remedies for social evils, on matters where the wisest men have doubted and differed."* Mr. Whewell, in conclusion, pointed to the religious elevation of mind to which the proceedings of the Association led, shewing that those who take the lead in our meetings have their minds so tuned, that every voice which proclaims the wonders of Nature turns their thoughts to the Author of Nature; that every new gleam of truth seems to them an effluence from the eternal fountain of truth. Long may such habits of thought prevail among the philosophers of this land; and then we need not fear but that knowledge, hallowed and elevated by the spirit in which it is pursued, will be every way a blessing to man,—to his soul as well as to his body,—to his spiritual as well as to his intellectual being. Finally, the address spoke of the fitness of Plymouth, with its dockyards and other objects of interest, to be visited by the Association; and, in an affectionate manner of the learned gentleman's former intercourse with Cornwall, its mines and miners.

The Marquess of Northampton moved the thanks of the Association to the noblemen and gentlemen of Devon and Cornwall who had been pleased to give their presence and support to the Association, and particularly mentioned

* See the fruits in Professor Owen's admirable Report.

* Of which great Expedition happy accounts are recorded in this very sheet.

* We are at a loss to know by what indiscretions, or approach to indiscretions, the Statistical Section provoked this warning and rebuke.—*Ed. L. G.*

the names of Sir Thomas Acland and Sir Charles Lemon. He noticed the objection of the President to the Statistic Section, but stated that the danger existed in others also—even the innocent and lamb-like Geological Section had been censured. He spoke of the magnetic survey of the world as even more gigantic and more important than the chairman had stated it to be; it was joined in by nearly all the nations of the world,—a moral result almost greater than the scientific results that might be expected from it. He also alluded to the Niger Expedition that had lately sailed from this place, as the beginning of a work that might, perhaps, lead to the establishment of an association for the advancement of science in Timbuctoo. This might be thought Utopian; but Julius Cæsar, Horace, and Virgil, would have thought such an association in Britain quite as Utopian as we might now think one in Africa.

Sir Thomas Acland acknowledged the resolution in an animated address, in which he dwelt on the advantage of the Association in encouraging native talent if it existed, and introducing to the world, though of rare occurrence, such men, perhaps, as a Davy or a Watt.

The Rev. Mr. Conybeare moved a vote of thanks to the local officers, and Mr. Snow Harris returned thanks on their behalf.

On the motion of the Marquess of Northampton, thanks were voted to the President, who briefly acknowledged the compliment, and adjourned the meeting till the following evening.

Vital Statistics of Sheffield.—Dr. Holland's Report 'On the Vital Statistics of Sheffield,' prepared by a local Committee, and mentioned in our last *Gazette* as the only part of the sectional proceedings on Thursday which we postponed, was not entirely read, and went into very minute details. It described the situation of the town as favourable to health and the comforts of life; and its prosperity to have been continually advancing for the last hundred years, during which its population had increased from 16,000 to 117,000, according to the last census. The cutlery trade had, however, been seriously affected by the diminution of foreign demand; but the silversmiths and platers had not been injured. The poor-rates had fluctuated to an extraordinary extent, varying from 4000*l.* to 23,000*l.*, on a rental of about 46,000*l.*; at present they were 6500*l.*, and the existing distress was as severe as ever was experienced in any former period.

A comparison of mortality with other large manufacturing places was offered, and the conclusion arrived at that great capitals and concentrations of wealth were most unfavourable to the happiness of the surrounding people. The effects of several trades upon health and the length of life were also alluded to, and dry-grinding mentioned as the most fatal occupation, those employed in it being reckoned old men at the age of thirty-five. The deposits in the savings' banks had increased within the last three years, although trade had decreased, and amounted now to 148,000*l.*, from 5248 contributors. From this it was contended that the amount of deposits was no proof of the prosperity of the working classes.

Upon this point some observations were made by Mr. Rawson, Colonel Sykes, and Lord Ebrington; the latter of whom agreed with the opinion of the Report, that the increase of deposits was no proof of national prosperity, though a run upon savings' banks would be a sign of national distress.

After the numbers of non-resident members were made up to 435, as mentioned in our last, forty-two others arrived, and were registered; making the whole attendants 477. Among the latest were several learned foreigners, such as Professor Ritter, whom we mentioned in our last, Dr. Jacques, De Roeser of Bartenstein, Professor Wartmann of Lausanne, and Professor Caldwell of America.

AGRICULTURE IN CORNWALL, ETC.

Having in the beginning of this sheet departed from the routine in our report of the proceedings of the British Association, in order to lay before our readers an accurate account of Professor Owen's universally interesting paper on 'Fossil Reptilia,' we are farther induced to adopt a similar course with respect to Sir Chas. Lemon's historical and practical view of the agriculture of Cornwall, which, though of a more local nature, contains much matter to claim the attention of agriculturists throughout the empire. It was read in the Statistical Section on Monday, thus:—

The greater part of what follows was written a year and a quarter ago; but I was suddenly stopped in my inquiry by a circumstance which I will now relate, and which left me with an entire failure of proof regarding the proposition which I had principally in view. This paper, therefore, was thrown aside; and it is only because I think that the few agricultural facts which I then collected, and have since added to, may be of use to those who hereafter wish to know something of the produce of the county of Cornwall at the present time, that I have determined again to put on paper the scanty gleanings which, under the circumstances, I have been able to collect. Statistical collections are often of no value at the time when they are made, and the only fair way of determining their worth is to ask the question, "Had this been written fifty years ago, would it have been of use to inquirers at the present day?" If the answer with respect to this paper is in the affirmative, I am content to confess that I am not able to carry out my argument to the whole extent that I intended. My original paper was undertaken with this view. It occurred to me that as Cornwall is almost surrounded by sea, a test of the progress of its agriculture might be obtained by a comparison of its population at different times, checked by the imports of grain and flour at each respective period. During the earlier periods, I knew that I must rely only on the accidental observations of those who wrote on the state of the county generally; but for later times, I expected to have the books of the Customhouse to refer to for certain evidence of the amount of our trade with foreign countries, and with those districts of England from which we have been in the habit of importing corn; and consequently of the extent to which the population of the county has been dependent on resources exterior to itself. It was no small disappointment to me to find, after I had advanced to that part of the inquiry, that the books of the Customhouse at Falmouth, the principal place of import, had been destroyed about fourteen years ago. It appears that orders were received from London for their destruction, after certain extracts had been made; and those extracts give no information on the points which I have in view. The subsequent time is too short to lead to any important conclusions; and, thus baffled, I can do no more than record what I know of the present time, and afford to those who follow me the means of making those comparisons which are out of my reach. It is unnecessary to go very far back in search of records of Cornish agriculture, or to dwell very long on intermediate times; but a few passing notes, collected from the historians of the different times, may be acceptable. Down to the date of Frazer's "Agricultural Report of Cornwall" in 1794, these extracts seem to favour the opinion that at no time was the agriculture of the county very deficient, or very redundant, but that it sustained, or nearly sustained, the population, and rarely left a surplus. Leland, in his Journey in the time of Henry the Eighth, says that Roseland "is metely fertyle in corne and grasse;" but, from his description of the rest of the county, the impression on his mind seems to have been that Cornwall was "more fertyle in tynne than corne." Camden's opinion may at first seem to favour the idea of a redundant produce, but he is corrected by Carew, to whose opinion I should give greater weight, because he lived in the county which he described, and had opportunities of observing the changes produced by the seasons and the vicissitudes of trade. Camden says, that "grain is produced in Cornwall in such plenty, that it does not only supply their own necessary uses, but Spain also yearly with vast quantities of corn." Carew in some measure qualifies this statement, and says, hypothetically, that "*had not* the embargo with Spain foreclosed this trade, Cornwall *was likely, in a few years,* to reap no little wealth by the same. And yet, whoever looketh into the endeavour which the Cornish husbandman is driven to use about his tillage, shall find the travail painful, the time tedious, and the expenses very chargeable." Carew speaks also of the extensive cultivation of barley as a new thing, affording a valuable resource to the poor in dear seasons; "for they were principally relieved, and the labourers also fed by the bread made thereof." From this statement I infer that, in abundant seasons, there was a surplus for exportation, which Camden assumed to be regular; and in scarce seasons a deficiency, to be supplied by barley. In average years, the growth probably supplied the inhabitants, and no more. The direct agency of price in procuring this adaptation can hardly be described in better words than Carew's own:—"When the price of corn faileth, men generally give over surplus tillage, and break no more ground than will serve to supply their own turn; wherethrough it falleth out, than an ill-kerned year, or saved harvest, soon emptieth their old store, and leaveth them in necessity to seek new relief from other places." Dearth and high prices of course follow, and, as a necessary consequence, increased cultivation. Camden speaks of the increased fertility of particular spots in the county, and gives Roseland as an example. He derives the name of this district from Ross, signifying in British "a heath." The etymology is of no importance, except as affording him occasion for a remark on the industry of the inhabitants, which had rendered the barren land fruitful. Polwhele, on the other hand (upon what authority I know not), says that Roseland had, from the remotest times, been highly cultivated. Norden, whose journey was probably made in 1584 (though he wrote much later), describes the county in these words:—"Corne there is in competent abundance, of all kinds; yet is the soyle of the country for the most part but meane, especially in the middle parte; a greate parte whereof is mountanous, moorish, and craggy: which being yet hus-

banded, as the country lately has taken course, by burning their ground, and by soyling it with sea-sande, it becometh very profitable, especially for rye. The soyle also is very thin. The cattell in this countrye are not greate, their feedinge being but meane." Ogilby, whose itinerary was written in the reign of Charles II., describes the district of Roseland as sandy; but it was his business to look at roads, not country. At that time the high-road from Exeter to the Land's End ran through Roseland, and over King-Harry passage, which was then called "the King's High Ferry;" probably the two last words have in course of time, run into one. Blome's "Britannia" (temp. Charles II.) contains this remark, that Cornwall "is more inclined to sterility than fertility; but the parts near the sea, by reason of the industrious husbandman manuring the ground with sand and oreweed taken from sea-shore, beareth good corn."*

A little later there appeared in the "Philosophical Transactions" a paper entitled 'Improvements in Cornwall with Sea-Sand,' by Dr. Samuel Coxe. This paper bears no date, but appears to have been written about the year 1691. The following passage exhibits the custom then in use of exhausting the land by repeated cropping:—"When this sand is brought home, it is spread on the ground intended for wheat; or usually in the first crop of four, whatever may be the grain. After four crops, 'tis our custom to leave our land to pasture for six or seven years before we till it again." Dr. Cox says that—"This sea-sand is mostly carried on horseback, but in some places is fetched by wheels." He computes the whole expense of its land carriage at 32,000*l.* per year. About forty years later, Tonkin makes the following remarks on the agriculture of his time, shewing that Cornish husbandry still presented the same features. After confirming Carew's account of the process of beating, burning, scorching, and sanding of coarse and furzy ground, but objecting to his estimate of twenty shillings an acre for the cost, saying that it amounted generally to forty shillings, he proceeds to describe the course of cropping, and the long rest given afterwards:—"The tiller generally takes six crops out of the land so prepared; viz. one of wheat, then two of oats, then one more of wheat, and two more of oats; or sometimes one of wheat, then one of oats, next one of wheat, and three of oats, according to the goodness of the land, and the manure they put upon it; and then if it is kept up for inclosure, after four or five years it will be fit for tillage again. But if the land be but ordinary, and not worth the keeping ud for inclosure, they let it run amain; and such will not answer the tilling anew under forty years or more." There is here no mention of barley; but in another place he speaks of the immense crops of barley grown in Meneage. Polwhele also speaks of that district as having from very early times been noted for its produce of barley. Tonkin mentions butts and wains, all drawn by oxen; but he says there were no carts or wagons, as being unsuited to the hilly and narrow ways. He refers to the scarcities in his time, when "very often the inhabitants do soon cry out on the least pinch." Borlase, who wrote in 1756, says that at that time the manure used came chiefly from the sea, and he regrets that marl was not more sought after. We have in Borlase the first mention which I have been able to find of the culture of turnips. This expression is—"Of late the turnip husbandry has begun to obtain, and several gentlemen have experienced the benefit of this useful root, in feeding sheep and other cattle, and mellowing the land for corn. The potato is still a more useful root, now every where cultivated." After quoting Camden's observation that Cornwall produced corn, "not only to supply the necessary uses of the inhabitants, but Spain also, with vast quantities of corn," he proceeds:—"The inhabitants, since Camden's time, are more advanced in number than the tillage has increased in proportion; and though the low lands in Cornwall, especially along the Tamar and Alan, may yield more corn than the inhabitants of those parts, and the less fruitful hundreds of Stratton and Lesnewyth, can dispense with; yet the hundreds of Powder, Kerrier, and Penwith, and the western parts of Pydre, do not yield corn near sufficient to supply the inhabitants. Upon the whole, if those parts entirely addicted to husbandry will yield a sufficiency of grain to make up, in a moderate year, what is wanting in the parts less cultivated and more addicted to mining, this is full as much as can be asserted in this particular." These accounts also agree in representing the gross produce of the county in articles of food for man as hardly equal to the wants of the inhabitants, but approaching near to an equality in ordinary seasons. Unless, therefore, events such as that related by Tonkin, in the following words, were of frequent occurrence, the number of inhabitants may be taken as some sort of criterion of the productive effect of the agriculture of the county. Tonkin relates that "there was a shower of wheat near Resprin Bridge, in the parish of Lanhydrock, which was attested to me by the late Mr. John Hosken, Vicar of St. Piran in the Sands, who had some of it."

In 1794, Mr. Frazer was employed by the Board of Agriculture to make a survey of the county. His report contains the following sentences. I must however, premise that Frazer's epoch is one of peculiar interest; for it is the pivot on which turned the change which occurred when, from being a country generally exporting corn, England became one generally requiring an importation of corn to feed its inhabitants; for 1792 was the last year when any considerable quantity of corn was exported. "The internal parts of the county have remained hitherto uncultivated, and present to the view immense tracts of uncultivated waste and undivided commons, entirely in a state of Nature, and, excepting the mining districts, almost without inhabitants. Cultivation has proceeded but a short space from the sea. On the sea-shores and the valleys near the banks of the great rivers are the chief, and almost only, seats of cultivation. On the whole, Cornwall, populous as it is in the mining districts and along the sea-shore, yet, if agriculture was more attended to, there can be no doubt that it would supply subsistence to a much greater population than it possesses; and it is to be hoped that we shall soon hear no more of complaint of scarcity in a county where Nature has done so much, and man so little. It must be confessed that either agriculture has decayed, or the population has increased much beyond the advancement in the improvement of their lands. The management of the lands is uniform. Arable is sown with wheat, barley, or oats, as long as it will bear any; and then grass for eight or ten years, until the the land is recovered, and again capable of bearing corn. Very often it remains in furze or brambles for twenty-five or thirty years. Their chief dependence is on sea-sand. Carts are not used in Devon or Cornwall; every thing is carried on horses' backs. They cannot be induced to try any other mode of carriage. In some parts of the county turnips are introduced as a rotation crop; but the practice is not general. It is, in fact, only practised by gentlemen farmers, and the superior class of yeomanry. They neither drill nor hoe them, so that frequently the couch grass entirely covers the plants. In Cornwall, as nearly as I can calculate, the proportions of waste and uncultivated land stand thus:—One-third of the county is under a regular course of husbandry; one-third furze crofts, which are only broken up once in twenty-five or thirty years; one-third wholly uninclosed mountain or waste land. I am persuaded that there is at the lowest estimation 100,000 acres of waste land, which may be valued at 7*s.* 6*d.* per acre, and produce an annual rent of 37,500*l.* a-year, and yet leave a sufficiency of turbary for burning."

In 1808 Mr. Worgan was employed to make a general survey of the agriculture of the county. He seems to have been much struck with the advance made since the visit of Frazer in 1794; and says that no county exhibited greater improvement. Still he makes the same remark "that the course of crops is extremely reprehensible." "There is no circumstance which evinces the truth of this assertion more than the wretched, exhausted, foul appearance of the ground laid down with grass seeds; nor can it be otherwise after having been cropped with corn as long as it will bear any." He computes the average crops of wheat at eighteen, twenty, and twenty-two Winchester bushels per statute acre, and says that in strong lands as much as thirty or forty bushels are sometimes obtained. Barley he puts at thirty to sixty bushels, and says that the crop sometimes reaches ninety bushels. Oats forty to sixty. Potatoes from two hundred to six hundred Winchester bushels per acre. Of this crop he says, "If Cornwall does not grow wheat enough for its inhabitants, it supplies other counties with large quantities of potatoes. This year (1808) some ship-loads have been sent to London, and Portsmouth and Plymouth are furnished with many bushels annually from hence." Frazer also speaks of the great abundance of this produce; there being sometimes as much as nine hundred bushels obtained from a Cornish acre in the neighbourhood of Penzance, where two crops are ripened in one season. Polwhele quotes Hals to prove that potatoes were cultivated in Cornwall as early as the time of the Normans. I am quite at a loss to understand that passage. As a proof of the advance made in the mechanical means of husbandry, Mr. Worgan says that no county affords a greater variety of wheel and other carriages than Cornwall; such as the wagon, wain, one or two horse-cart, ox-butt, gurry-butt, slide, and sledge. From the foregoing accounts I deduce these two inferences.—that even as late as the year 1794, the practice of exhausting the land was general; and that, on the whole, the agriculture of the county did not more than feed its own inhabitants.

As to the number of those inhabitants, we have at first, but little to guide us. Carew

* So many of these writers having thought it worth while to remark on the use of sea-sand in Cornwall, and there having been about this time a paper in the "Philosophical Transactions," written expressly to explain the mode of use and benefit of this manure, make it appear as if there had been something peculiar to Cornwall in the custom, which was not known in other maritime countries.

* Carew says, that large quantities of garlic were cultivated in Stratton for exportation.

mentions a muster-roll, but does not give its amount. He dissents from the opinion of those who thought that the numbers had of late *diminished;* but does not speak confidently of an increase. Lysons refers to a poll-tax in the time of Edward the Third (1377), and thence calculates the whole population of the county of Cornwall, making allowance for those not assessed, at 34,960 persons. Accurate and industrious as he was, I dare not dispute his authority; but Chalmers, who seems to quote the record, gives the return for Cornwall at 51,411. As, however, Lysons wrote with an especial view to Cornwall, and Chalmers, in his estimate of the wealth of England, only incidentally refers to this county, I think it safest and best to abide by Lysons. The population of all England and Wales was then, according to the same poll-tax, 2,353,203 persons. I shall presently shew that, in Carew's time, the whole population of England and Wales had about doubled. It is reasonable to conclude, therefore, that the population of Cornwall had doubled also, and comprised 69,900 persons. The estimate for England in Carew's time is arrived at by the following means:—Harrison, quoted by Hume, has given the result of a muster roll of fighting men taken in 1575; and Sir Walter Raleigh asserts that there was a general review in 1583 of all the men capable of bearing arms. These two accounts agree in representing the fighting men to have been about 1,172,000, and therefore are worthy of some confidence. But as they far exceed all other computations, one of which, according to Hume, made the whole population at that time only 900,000 souls, I think it probable that the enumeration was pushed to its utmost extent, and that many a stout boy under twenty years of age, who could draw a bow, was returned as a fighting-man. Their number may be taken to balance the number of old men incapable of bearing arms; and as Mr. Rickman has shewn that the age of twenty divides the male population into two equal parts; and as the females are always nearly equal to the males, I multiply the supposed fighting men by four, for the whole population; which I take to have been 4,688,000, or nearly double that of 1377. The number of the people of Cornwall in 1700 is stated by Marshall (I know not how computed) to have been 105,800; and as the great increase in our population which has since occurred, probably arose, and has proceeded, *pari passu*, with the developement of the copper mines, it seems not unreasonable to suppose that, previous to the existence of the copper mines on a great scale (that is, previous to the time of Tonkin), the rate of increase was slow and inconsiderable. I venture, therefore, to take the population of 1700, namely, 105,800 persons, as a fair approximation to that of 1691 and 1733; that is to say, the date of the article in the "Philosophical Transactions" which I have quoted, and that of Tonkin's notes. The population of England and Wales, according to Mr. Finlaison's calculation, was, in 1760, 6,479,730. Assuming, therefore, that the population of Cornwall bore the same proportion to that of all England and Wales, as when the census was taken in 1801, 1811, 1821, and 1831 (that is, as one to $47\frac{1}{3}$), the population of Cornwall will have been, at the time mentioned, about 137,000. Borlase's book preceded this date by only a few years; and the population may fairly be assumed to have been, in Borlase's time, about 135,000 persons. By the census of 1801, the population of Cornwall appears to have been 188,269 persons; and the census of 1811 shews that, during the preceding ten years, the population had increased at the rate of 15 per cent. Supposing that the increase in the seven years preceding 1801 was at the same rate, the population of the county in 1794 may be assumed to have been about 171,000 persons. We are now in a condition to frame a table of the population which probably *was* fed by the agriculture of the county from 1583 to 1794, and it will stand thus:—

	Population.	Increase per cent of agricultural produce.
1583	69,900	.. ..
1691 } 1733 }	105,800	.. .. .. 51 .. .. ..
1756	135,000	.. .. .. 28 .. .. ..
1794	171,000	.. .. .. 26¾ .. .. ..
The whole period		.. .. .. 144 .. .. ..

Such may be presumed to have been the progress of agriculture in Cornwall during 200 years; that is, up to the time of Frazer's Report. I can carry this comparison no farther, for we are now arrived within the limits of official accuracy; and the foregoing slight indications, which may be accepted as evidence of fact, however inconclusive, with respect to remote times, are now of no value whatever to any one accustomed to rely on official documents, and the detailed returns of recent transactions, which we are in the habit of seeing made to both houses of Parliament. Upon almost every other subject correct information may be obtained; but, for the reason I have stated, it is impossible to estimate the coasting trade in corn and flour beyond fourteen years ago. I am content, therefore, to pass on to the present time; and to inquire what information may be obtained as to the present state of the county, its products, and its population? In a few weeks we shall know accurately what are our present numbers; but I presume that we shall find it to be about 345,000. This increased and increasing population is dependent for subsistence on our agriculture and fisheries; aided, perhaps, by some small supply of corn by the coasting-trade, if it should be found that the quantity of that article weighed against the export of potatoes, cattle and other produce turns the balance in that direction. It must be borne in mind, that since 1832 up to the middle of 1836, there had been no considerable importation of foreign corn into England generally. Consequently the home trade by itself affords a true measure of the traffic in grain of Cornwall in particular. From official sources I have compiled the following Tables:—

TABLE A.

Coasting Trade of Cornwall in Corn and Flour.

		Qrs. imported.	Qrs. exported.
1836	Wheat	6,897	8,692
	Flour (105,228 cwts.) =	30,065 (1612 cwts.)	460
	Barley	5,748	41,352
	Malt	3,159	7,861
	Oats	7,115	10,304
1837	Wheat	8,610	6,314
	Flour (149,099 cwts.) =	42,574 (6088 cwts.)	1,739
	Barley	7,552	26,536
	Malt	2,544	4,388
	Oats	4,377	3,677
1838	Wheat	11,960	3,009
	Flour (128,060 cwts.) =	36,588 (3068 cwts.)	832
	Barley	9,060	22,889
	Malt	2,916	5,492
	Oats	1,462	2,368

The trade with Ireland, not included in Table A, was as follows. There was no export from Cornwall to Ireland:—

TABLE B.

Corn and Flour imported from Ireland.

		Quarters imported.
1836	Wheat	1,027
	Flour (75,449 cwts)	21,556
	Barley	34
	Oats	11,896
1837	Wheat	563
	Flour (50,360 cwts.)	14,388
	Barley	258
	Oats	21,750
1838	Wheat	2,500
	Flour (82,233 cwts.)	23,495
	Barley	863
	Oats	22,220

There is some oatmeal and grits imported annually from Ireland, but the quantity is not considerable.

TABLE C.

Shewing the total Imports and Exports of Grain and Flour from all Places, Ireland included, and the Balance resulting:—

Wheat and Wheat-Flour.

	Qrs. imported.	Qrs. exported.	Difference.
1836	59,545	9,152	50,393
1837	66,140	8,153	57,987
1838	74,563	3,891	70,672
			3)179,052
Average quarters imported			59,684

Barley and Malt.

1836	8,991	49,213	40,222
1837	10,354	30,924	20,570
1838	12,859	28,371	15,512
			3)76,304
Average quarters exported			25,435

Oats.

1836	19,011	10,304	8,617
1837	26,127	3,677	22,450
1838	23,632	2,303	21,314
			3)52,371
Average quarters imported			17,457

Reducing the two latter to the standard of wheat, that is, taking barley at half, and oats at one-third the value of wheat, we have the total deficiency of grain in quarters of wheat as follows:—

Wheat and flour imported	59,684
Oats imported, reduced to wheat	5,819
	65,503
Deduct barley exported, reduced to wheat	12,717
	52,786

Thus, it appears that there was an annual deficiency of grain in the county to the amount of 52,786 quarters of wheat; and supposing the consumption to be the same in Cornwall as elsewhere throughout England, namely, one quarter of wheat per annum to each person, there will have been the same number of persons to be fed by importation; that is to say, rather less than one-sixth of the population at that time. Now let us see how far the balance is restored by the export of agricultural produce of other kinds raised in the county, but not used by its inhabitants:—

First, of *Potatoes*.—Of these no official account can be obtained; but from private sources I have received the following information, which I believe may be relied upon, for the year 1839. But as that year happened to be a year of less export than the preceding years, it is not fair to assume that it affords a full average. I am told, also, that in proportion as the means of transport have increased, and will probably continue to increase, the trade in potatoes may be considered as a growing trade, which is capable of immense developement. The increase of steam communication has already produced a great effect, subsequent to the transactions which I am about to relate:—

	Cwts.
In 1839 there were exported from Falmouth, during the first six weeks of the season, 600 baskets of potatoes per week, each weighing 1 cwt.	3,600
Probably, during the remainder of the season, as much as	3,000
From Hayle, during the whole season	250
From Penzance	3,000
From Looe and other parts of the county	150
Total potatoes exported	11,000

As a large portion of these is the very early produce of Penzance and its neighbourhood, which comes into competition with the forced potatoes of the London market, the price at which it is sold is very high. Very early in

the season the price of potatoes sent to London per steamer is about 2*l.* per Cornish bushel, or 1*l.* per basket. The export continues till the price falls to 10*s.* per basket, or perhaps to 7*s.* 6*d.*; but very little is sent when they fall to this latter price, so that 15*s.* may be considered the average price. Suppose that the whole quantity is sold at an average price throughout the year of 10*s.* per basket, the value will be 5845*l.* equal to 2050 quarters of wheat at 57*s.* I am induced to think that the above is below the fact, because one company took credit in the months of May and June 1836 for 742*l.* 10*s.* for the transport of Cornish vegetables (including 650 baskets of potatoes of 1 cwt. each), which were shipped for London by steamers at a freight of 2*s.* per cwt. It is clear, also, that other vegetables are shipped at Falmouth for the London market; but I have no means of computing the amount.

Next, with respect to *Cattle*.—It is quite impossible to get an accurate account of the cattle which annually cross the border to and from Devonshire. The following information is derived from two very considerable Cornish dealers, and from one Devonshire person engaged in the same traffic, who are in the habit of attending the fairs in the county. Though they differ in the gross amount, they agree in this—that nearly five times as many beasts are driven out of the county as come into it. One account states the number driven outwards at 6000; but says that many of these are small steers, weighing from 5 to 6 cwt. and worth from 7*l.* to 10*l.* each. Another values them higher, and makes the number going out only about 3000, and coming in about 500. The third says, only that two-thirds of all the oxen bred in the county are sent upwards to be fattened, besides some heifers and cows; and that since the breed of cattle has been so much improved in Cornwall, the number imported from the north of Devon has greatly decreased. With respect to sheep and lambs, it appears that all that are reared are fattened and consumed in the county. Now, taking the mean of these accounts, that is, 4500 beasts as going out of the county and 900 coming in, we have 3600 beasts as the balance of export in cattle to be carried to the credit of the agricultural produce of the county generally. If we take these at 8*l.* 10*s.* per head, they will have been worth 30,600*l.*, which, reduced to the standard of wheat at 57*s.* per quarter, will represent 10,736 quarters. It is quite impossible to ascertain the quantity of the supplies afforded to the shipping not belonging to the county, at Falmouth, Penzance, and other ports. It is, therefore, by a mere guess, that I take it at the value of 5000 quarters of wheat. It is said, that by the packets alone a sum of 100,000*l.* is annually expended at Falmouth, a great part of which must be for provisions consumed by those who do not belong altogether to the county. Vessels of all kinds are in the habit of taking in supplies at Falmouth, which are sometimes valuable, and would occupy a large portion of the 5000 quarters which I take for the whole county. Then, as a set-off against the deficiency before stated, namely, 52,786 quarters of wheat, there will be—

For potatoes exported	2,050 quarters of wheat.
For cattle ditto	10,736
For the shipping	5,000
Total exports	17,786

This should be deducted from 52,786 quarters of wheat, and there will remain a deficiency of 35,000 quarters. I conclude, then, that the agricultural produce of the county is insufficient for its own inhabitants, to the extent of 35,000 quarters of wheat. Now, the value of the above 35,000 quarters at 57*s.* per quarter, is 99,750*l.*; and this sum must be annually paid out of the exports of the county to the parties supplying us with corn. These exports may be estimated as follows; they are almost entirely of minerals and fish:—

Copper ore, average of 1838 and 1839	£662,527
Tin ditto, ditto, sold at ticketings	215,895
Ditto, ditto, sold by private contract, say one-third	71,965
Lead	13,680
Silver	14,777
Iron	16,103
Sulphur, arsenic, &c.	—
Granite { Shipped at Penryn, 6019 tons, 6150*l.* / Ditto at par, 2464 tons, 2517*l.* }	8,667
China-clay	—
Slate	—
Fish (pilchards)	26,385
Total exports	1,232,004

The value and quantity of pilchards exported in 1838 was (exclusive of shipping charges)—

3182	hogsheads	at 52*s.*	£8,273
4393	ditto	at 56*s.*	12,314
			20,587

In 1839—

5959	hogsheads	at 52*s.*	£15,493
6897	ditto	at 60*s.*	20,691
			36,184
Average value			28,385

Comparing these exports with the deficiency of agricultural produce, it would appear that one-twelfth of our annual exports is spent to procure food for the population at home. The only method by which I can get at any knowledge of the quantity of cattle and sheep slaughtered and consumed in the county is from the tanyards. A gentleman to whom I have great obligations has taken considerable pains to collect a true account of the hides and skins tanned by the various tanners throughout the county in the year 1839. The result is—

Bullocks	15,950
Calves	11,550
Sheep	56,600

Computing the carcass of each bullock at 6 cwts., each calf at 1 cwt., and each sheep at 1½ cwt., the gross amount will be 135,500 cwts., equal to about 45 lbs. for each person of a population of 336,000 souls: this is exclusive of pig-meat. The skins of pigs not coming to the tan-yard, I have no means of computing their number, but the amount is certainly great. Before I quit this subject, I will quote a quaint passage from Carew, which shews the quality of the sheep in his day, and the nature of the wool. "The sheepe generally had little bodies and coarse fleeces, so as their wool bore no better name than Cornish hair; and for such hath been transported without paying custom."

Mr. Couling, who gave his evidence before the Emigration Committee in 1827, says that there were then in Cornwall—

Of cultivated land	550,000 acres.
Of improvable waste	190,000
Of unprofitable land	109,000

Of the improvable land, which was mere waste at that time, vast quantities have been brought under the plough; and not a year passes in which this cultivation is not extended. With a view of ascertaining the qualities of the raw material out of which these improvements have been wrought, and in the hope that such knowledge may be available for future improvements, I have had specimens of the natural soil analysed, taken from wastes on the three principal geological formations,—the killas or slate, the granite, and the serpentine. Out of these the work has been done; and the success which has attended their conversion into fertile land must have proceeded either from the addition of something wanting in their composition, or the removal of something deleterious. I subjoin an analysis of each kind of soil by Mr. Phillips, of the Museum of Economic Geology:—

No. I. Killas, from Goonreath Downs, eight inches deep.

Silica	80·2
Alumina, with a trace of oxide of iron	16·0
Vegetable matter	3·8
	100·0

No. II. Under the above, sixteen inches deep.

Silica	77·5
Alumina, with a trace of sulphate of lime	15·4
Oxide of iron	4·3
Vegetable matter	4·3
	100·0

No. III. Granite, from Gadlins, near Penryn.

Silica	74·0
Alumina, with a trace of sulphate of lime	16·0
Oxide of iron	5·9
Vegetable matter	4·1
	100·0

No. IV. Serpentine, from Goonhely Downs, near Trevivian, St. Keverne.

Silica	70·0
Alumina, with a trace of sulphate of lime	20·0
Oxide of iron	6·2
Vegetable matter	3·8
	100·0

The first thing which strikes us here, is the great similarity in the ingredients and the proportions in all these specimens, and the total absence of some of the characteristic components of the rocks beneath. The felspar in granite contains about 17 per cent of potash; but there is no potash in the soil above. The serpentine contains from 30 to 40 per cent of magnesia; but there is no magnesia in the soil of Goonhely Downs. Yet, these are indestructible substances; and if the soil had been formed by decomposition of the rocks beneath, a considerable quantity of each must have been present. Moreover, there would have been no alumina in that derived from serpentine, which contains none. These facts are so extraordinary, that I should doubt the accuracy of the analysis, were it not that Dr. Daubeny analysed the soil of Goonhely Downs a year ago and arrived at the same result. Hence arises this very difficult geological problem, which I am quite unable to solve, and with which I will conclude this paper. These deposits are on high ground; in the case of Goonhely Downs, extending over a very extensive and elevated plateau. Whence did they come? how formed? or how transported? *

PARIS LETTER.

August 10, 1841.

Academy of Sciences. Sitting of July 19.—M. Regnault, in the name of the Commission lately appointed to report 'On the Apparatus for Detecting Arsenic in Animal Substances,' requested M. Magendie to explain a phrase in the last number of the Journal of the Academy; in which, when speaking of the report of the Commission, he had said (what had not been actually contained in the report), "that to seek by means of methods of great delicacy and difficult manipulation, for the presence of arsenical matter in animal tissues, in order to apply the conclusions thence deduced to forensic medicine, was, in his (M. Magendie's) opinion, a plan by which the most skilful men might sometimes fall into error, and from which the most fatal results in juridical decisions might ensue." M. Magendie explained. He merely intended to say, that the most serious errors might be made, and that therefore it was important that experiments of this nature should only be intrusted to the most skilful chemists; otherwise, juries might be greatly misled. Often experiments of this nature were con-

* Sir C. Lemon is, we believe, about to add to the obligations of his county for this paper, by following it up with experiments of the soils with mineral manures; and making the results known to the world.—*Ed. L. G.*

fided to druggists, who, though able men, were not sufficiently instructed in the delicate system of experimentation thus required; or else the experiments were given to be made by men who were merely chemists in name, and who were totally unfit to conduct them. M. Regnault replied, that the Commission, though it had stated in its report that the apparatus of Marsh could detect, to a certainty, very small quantities of arsenic, it was by no means intended to say that the procedure should be confided to any but the most skilful experimenters. The Commission, therefore, agreed with M. Magendie, and wished it to be understood, that in no case should the sworn examiner depend only upon the physical characters of the stains obtained by Marsh's apparatus. It even proscribed the method of stains from being appealed to at all; and it wished to shew that the sworn examiner ought in all cases to be obliged to put in the hands of the judge arsenic with *all its characteristics*. In the opinion of the Commission, Marsh's apparatus, considered merely as a means of producing stains, was of no value; but considered as a means of concentrating the arsenic, in order afterwards to recognise its characteristics by other known chemical procedures, was in that case an apparatus that might be depended on, even in the most difficult cases. (It will be remembered, that in the case of Madame Laffarge the *sole* evidence on which she was condemned was the *ipse dixit* of M. Orfila concerning stains obtained by Marsh's apparatus; those stains having been pronounced by him to be arsenical from their *look* alone. If, therefore, this report of the Commission be entitled to any respect whatever, M. Orfila's opinion is thereby declared to be erroneously, or rather insufficiently, grounded. This, added to the fact that *all other* means of detecting the supposed arsenic in the body of M. Laffarge had failed, would, in any other country but one of such strong prejudices and ignorance as France, cause the whole of the proceedings in such a case to be set aside. But the last footsteps of Astræa were not left among the French!)

A letter was read from Messrs. Flandin and Danger, the chemists, requiring explanations of part of the same report which they fancied made against them. M. Dumas replied, that the positions advanced by Messrs. Flandin and Danger were these:—1. That stains may be obtained from Marsh's apparatus without arsenic. 2. That sulphites, phosphites, and organic substances, under an electro-chemical force, would produce such stains. 3. That these were the kind of stains which Messrs. Orfila and Couerbe had mistaken for arsenical stains, and had miscalled normal arsenic. The Commission, M. Dumas added, had found and proved that the first of these points was correct; that with regard to the second, it was erroneous, since these stains (obtained without arsenic) arose from nothing more than carbon deposited by the animal substances; and the phosphoric acid of which, being carried off, prevented the combustion. As for the third point, the Commission could not speak, *since they had never seen any normal arsenic*. M. Dumas, in the name of the Commission, added that they wished to declare what a high opinion they entertained of the observations of Messrs. Flandin and Danger, and that they placed their experiments in the first line of those that they had been charged to investigate.

Sitting of July 26th.—M. Magendie continued the reading of the report of the Committee for conducting experiments on gelatine. In a first series of experiments, in which gelatine was administered to dogs as the only article of food, it was given both dry and in jelly; the animals soon became disgusted with it, some would not touch it at all, and every one died of starvation after a longer or shorter period, according to their age. In a second series, gelatine was administered in a savoury state, that is to say, as it is sold in the pork-shops,—a form in which it is considered a delicacy. The dogs ate it at first, but then became disgusted with it, refused it, and all died within three weeks. In a third series of experiments, some dogs were allowed only water as their sole aliment, and others were kept without any food at all. Those who ate nothing at all lived as long as those that were fed on gelatine; those that drunk water lived eight or ten days longer; but the young dogs died immediately in either case. In a fourth series, gelatine was given mixed with other substances, such as bread, white of eggs, &c. Some of the dogs lived eighty or ninety days on this food; but they grew thin, gave out a fœtid odour, and at last died. If, while they were ill, common meat was given, they got better directly. In a fifth series, the *bouillon*, or soup made from gelatine extracted from bones by the process used at the Hôpital St. Louis for the patients there, was given to some dogs; and the *bouillon*, or soup sold by the Compagnie Hollandaise at their shop in Paris, was given to others. Those that began with the former continued well for fifty-six days, but got very thin; they then had the latter administered, and became fatter immediately. Those that began with the latter got fatter all the time for fifty-six days, and then on the former being given them, became thin. In a sixth series, bones were given from which the calcareous salts had been extracted by means of muriatic acid. The dogs soon refused this aliment, and died of starvation. In a seventh series, beef tendons were administered exclusively to a dog; he ate well of them at first, but was afterwards attacked with diarrhœa, and refused them. Bones were then given him, and he got better directly. The reading was then adjourned.—Professor Dumeril and M. Valenciennes, of the Garden of Plants, communicated the result of the incubation of the boa-constrictor, which we noticed a short time since. The principal point to be observed was, that the animal had certainly communicated heat to the eggs; this had been denied by some naturalists as never taking place with serpents; but it had now been found that within the sort of cone which the mother made by rolling herself up and lying over the eggs, the heat was greater by twenty degrees of the centigrade scale, or thirty-six of Fahrenheit, than the heat of the air outside the cone. This heat diminished as the period of breaking the shells approached. Fifty-six days was the term of incubation. M. Arago briefly stated that M. Mulot fully expected the water of the well of Grenelle to attain a height of 100 feet above the orifice.

Sitting of August 2.—M. Arago presented to the Academy an instrument, made by M. Jurgensen, for ascertaining the mean temperature of the atmosphere during a given period. This was effected by the aid of a sort of chronometer, made exceedingly liable to expansion or contraction in its springs by heat or cold, and shewing, in an exaggerated manner, the effects of such expansion or contraction in its rate of going. The ordinary rate of this chronometer at a certain temperature being known, it became easy to find, from its gain or loss, how much the rate of expansion or contraction had been increased in the time required, and hence to ascertain what the mean variation of the temperature had been during that period. The ascertaining of the mean temperature by ordinary thermometers is known to be a work of labour, requiring numerous observations and calculations.—The reading of the third and last part of the Report of the Gelatine Commission was made by M. Magendie. He stated that the latter portion of the experiments referred to other substances than gelatine, with the view of comparing the results of exclusive nourishment with them. It had been found that albumine, such as the white of eggs, was speedily refused by dogs, who all died of starvation sooner than touch it. It was not the same with fibrine, which had been extracted from blood, and purified: several dogs had eaten of this substance for nearly two months in considerable quantities, but at length refused it, and on the seventy-fifth day died of starvation. A curious phenomenon was witnessed in this instance, that the blood of these animals was greatly diminished in quantity. Gelatine had been mixed with this substance, but had been constantly refused by the dogs. Fibrine extracted from muscular flesh was at first eaten by the dogs, but was at length refused, and the dogs ultimately grew thin, refused it, and died of starvation. An experiment was tried by mixing together fibrine, albumine, and gelatine (all extracted separately, and made as pure as possible); but this was not altogether successful, the animals getting very thin upon it. Hence the committee inferred that for some alimentation nothing could replace meat in its natural state. Other substances were also experimented on, such as butter, axonge, animal fat, and other greasy matters. In general, the dogs ate butter, without any other food, greedily for the first few days, but at length renounced it altogether. One dog, however, continued to live on it for the period of sixty-eight days, when he died in a state of great corpulence, smelling of butter in the most horrible manner, and with all his internal organs, as was ascertained on opening the carcass, completely infiltrated with greasy matter. Axonge had been found capable of supporting life a little better, but the ultimate results were the same. The fat of beef had sufficed to keep a small dog alive for more than a year; but other dogs had grown thin upon it, and had at length died. Gluten had been tried as an exclusive aliment for dogs, and had succeeded tolerably well; some of the animals not suffering much loss of strength or fatness from it; but fecula given exclusively had failed, and had appeared to possess very few nutritious properties. The conclusions of the Committee enunciated at the end of their Report were in accordance with the above results; they declared their conviction that such substances taken singly had by no means the same result as when united by the hand of Nature, and that nothing could replace ordinary meat; but they added, that they could not as yet pronounce upon the effects of gelatine when given as an exclusive aliment to man. Their experiments were not yet complete, and other series were in the course of being tried.—A discussion ensued as to whether the Academy should sanction this Report by a formal vote; but, on the observation of M. Blainville, this was decided not to be done at present. The Report was ordered to be printed in full in the "Memoirs of the Academy."

Antiquities.—On the hill of Fourvières (*Forum vetus*), at Lyons, there were found, on the 19th ult., numerous articles of Roman jewellery, for females, in fine preservation. Among

others, there was a pearl necklace, an amethyst necklace, one in solid gold, two bracelets, &c. There were also found two gold coins of Augustus, weighing about twenty francs each: on one was the figure of Jupiter. The gold of all these articles was so pure that it was not in the least tarnished.—A mosaic Roman pavement, in fine preservation, has been lately found near Orbe, in the Vaud (Switzerland).—M. A. le Noble, who has been making researches in the libraries of Switzerland, has recently discovered an inedited letter of Abailard to Heloisa, together with several hymns in Latin verse, compiled by him for the nuns of the Paraclete. He has also found a Carlovingian genealogy of the ninth century, in a MS. at Zurich. These will also be published in one of the forthcoming numbers of the "Bibliothèque de l'Ecole de Chartes."—M. Pierre Victor has published an interesting *coup d'œil* of the antiquities of Sweden, Norway, and Denmark; part of which has already appeared in that interesting and well-conducted publication, "La France Littéraire" (the *Literary Gazette* of France).—The Société d'Histoire de la Suisse Romande has just published, at Lausanne, an "Historical Essay on the Antiquities of the Valley of the Lac de Joux," by M. Nicole; and also an "Essay on the Waldstetten, as connected with the Germanic Empire and the House of Hapsburg," by M. Hiseley.

Obituary.—Madame Manzoni, mother of the author, died at Milan a short time since, aged seventy-seven.—M. Savary, member of the Académie des Sciences, and the Bureau des Longitudes, Professor of Geodesy at the Ecole Polytechnique, died on the 20th ult.—Professor Sanson, of the Faculty of Medicine, died a few days since.

At the recent examination for the degree of Licentiate in Letters, in the Academy of Paris, which lasted from the 12th to the 16th ult., *fifteen* candidates, out of twenty-four who presented themselves, were rejected (*Anglicè*, plucked).

Books (France).—The Abbé Bourassé has published, at Tours, a valuable volume of Christian archæology, forming a kind of manual for students.—There is now publishing, in the "Moniteur," a very valuable series of reports on the exact condition and contents of the departmental archives of France. That portion of the report which relates to the archives of Láon (the department of the Aisne), drawn up by M. Charles Berthaut, the keeper of the archives, is distinguished for its learning and accuracy. This gentleman is one of the most promising among the younger archæologists of France.—The same journal has recently published some highly curious reports from M. Nestor l'Hôte, on inedited Egyptian MSS. and antiquities.—The sixth number of the "Bulletin de la Société de l'Histoire de France," for the current year, announces that the Society has determined on publishing a new edition of the "Coutumes et Usages de Beauvoisis," which will form the *suite* to the "Agizes de Jerusalem," now publishing by the Académie des Inscriptions. The "Histoire de Bayart," and the "Mémoires de Robert de la Marche, sire de Fleuranges" (1499–1521), have also been put on the publishing list of the Society. The following works are now in the press, or nearly ready for distribution to the members:—"Correspondance inédite de Marguerite d'Angoulême;" "Mémoires et Correspondance de Marguerite de Valois;" "Mémoires du Comte de Coligny et du Marquis de Villette;" "Procès de Jeanne d'Arc" (inedited MS.); "Works of the Abbé Suger;" "Eginhard," Vol. II.; "Ordericus Vitalis," Vol. III.; "P. de Comynes," Vol. II.; "Guillaume de Nangis," Vols. I. to IV.—M. Emile Leconte, architect, is publishing a "Monographical Account of Nôtre Dame de Paris," with professional engravings, plans, &c., of the highest merit. It will consist of fifteen or sixteen folio numbers, with sixty to seventy plates, price six francs the number.—The first volume of M. Michelet's "Procès des Templiers," published by order of Government, is out, and forms a valuable addition to the historical memoirs of France. A fifth volume of his "History of France" is nearly ready.

LITERARY AND LEARNED.

THE ROYAL SOCIETY OF NORTHERN ANTIQUARIES

HELD its quarterly meeting at Copenhagen on the 19th July. The third volume of "Historical Narratives of Icelandic Voyages at Home and Abroad," containing the adventures of Nial and his sons, with explanatory notes by N. M. Petersen, was laid before the meeting as ready for the press. His majesty the King of Denmark presented another bequest of copies of MSS. relating to northern history, from the archives of Königsberg. Mr. Marsh, of Burlington in North America, presented a copy of his grammar of the old northern or Icelandic language, composed in English after the works of Rask. Mons. Sourdeval of Tours submitted his "Etudes Gothiques," with the notification that he had prepared an old northern or Icelandic grammar in French, which was immediately to be published. Major North Ludlow Beamish of Cork, in Ireland, presented his work entitled "The Discovery of America by the Northmen in the Tenth Century, with Notices of the early Settlements of the Irish in the Western Hemisphere," founded upon Professor Rafn's "Antiquitates Americanæ." Dr. Smith of Boston presented "Davis's Lecture on the Discovery of America by the Northmen, 500 years before Columbus," fifth edition. This lecture was delivered in New York, New Haven, Philadelphia, Baltimore, Washington, and other towns in the United States, and awakened great public interest. Professor Rafn exhibited some specimens of maple, transmitted by Dr. Webb of Rhode Island, with reference to the *Mösur* wood mentioned in the Saga of Erik the Red. These are varieties of the *acer saccharinum* called "bird's-eye" and "sugar maple," the beautiful shades of which render them peculiarly suitable to fine cabinet work. This is unquestionably the same description of wood which the ancient Northmen called *Mösur*, and a piece of which, brought by Thorfinn Karlsefne from Vinland to Norway in 1014, was sold for a considerable sum to a German from Bremen. Some ancient Indian stone articles from Ohio were exhibited to the meeting. They bear a marked resemblance to Northern remains found in the neighbourhood of Aarkuus, which were shewn by Professor Thompson to have served formerly as means of payment. The following distinguished personages were admitted members of the Society: His Imperial Majesty Nicholas I. emperor of Russia, his Majesty Frederick William IV. king of Prussia, his Serene Highness the Grand Duke of Nassau, Professor Afzelius of Upsola, Colonel Asenales of Buenos Ayres, Dr. Björn of Nyborg, Count de Cardenos of Piemont, Professor Stein, Capt. Thestrup, &c. &c.

SKETCHES.

WILLIAM AND ROBERT CHAMBERS.

FROM causes unnecessary to be here investigated, the profession of *Journalist* in England has always been one of dubious character. Few of those who have followed it have, as on the Continent, taken a high and firm stand among the upper classes of the community; and *to be literary* has, on the contrary, been almost an exclusion from the intimacy and confidence even of parties of equal fortune and co-ordinate station in society. Great discretion is required to avoid encroachment on the privacies of life, in men who have the pen in their hands, and whose business it is to supply the wide world with all the variety of information which their means can obtain. Secrets to them are like burning coals, and news like running water; it is most trying to hold the one, and exceedingly difficult to dam up the other. Yet both acts of retinence are indispensable to the attainment and preservation of place amid the free and unrestrained intercourse of mankind; and much self-denial must be practised before the Journalist can expect to be cordially received and frankly trusted. The fear of him once overcome, his, however, is a position as pleasant to himself as useful to the public; and instead of being proscribed as dangerous, or at best admitted as convenient, agreeable, or intelligent, he finds himself known to be the watchful respecter of every breath that is not common as the air; the gentleman in all that concerns affairs of a private nature; the organ of influential opinion; and therefore the fit and desirable companion for any rank or condition into a connexion with which his opportunities may throw him.

It is most true that this point is not easy to reach; and that the practices of but too many of the caterers for the periodical press render it yet more difficult to their better conducted and more successful brethren. But this also renders it the more honourable; and when we read the names of the brothers at the head of this notice, we have the example set brightly before us of what real worth, perseverance, and talent, attended by the circumspection and reserve which are due to the social relations, can surely achieve. As to the genius of a Dickens, a gratifying demonstration was lately made in Edinburgh; so to the abilities, integrity, and valuable culture of literature by the Messrs. Chambers, as we learn from the Scottish newspapers, a tribute of well-earned applause has been paid by their native town of Peebles—of Peebles noted in ancient song:—

> "Was ne'er before in Scotland seen
> Sic dancing and deray;
> Neither at Christ's Kirk on the green,
> Nor Peebles at the play!"

The "Scotsman" newspaper gives a full account of the entertainment, which did equal credit to the givers and the receivers; for the manner in which our northern contemporaries began and have carried on their literary labours has been very honourable to themselves and beneficial to their country. They sprang from the respectable middle class of decent Caledonian life; their wealth was all to seek, their course to carve out by the direction of their own energy and exertion—

> "The world was all before them, where to choose,
> And Providence their guide."

Two youths, born and bred in a remote and quiet spot, unstirred by ambitious projects, and, since the olden times to which we have alluded, little favoured by inspirations from the muse, have been witnessed making their way from that obscurity to proud distinction by the exercise of the faculties with which Heaven had endowed them, and the application of their powers to a species of toil which they struck

out for themselves, and have industriously cultivated with excellent effect upon the morals and general improvement of tens of thousands of their fellow-creatures in every walk of life, informing the humblest, and, in truth, among the rising race, kindly and usefully, as well as considerately and instructively, teaching "the young idea how to shoot." The esteem for them, justly excited by the tenor of their whole existence, and by the services they have done the state, through the medium of their well-edited undertakings, has been acknowledged at a dinner given to them at Peebles on the occasion of their being presented with the freedom of that burgh by its magistrates and town council.* Above a hundred of their friends and admirers, including many of the surrounding gentry, attended the festival, and some interesting speeches were delivered in the course of the entertainment. The most interesting was the description which Mr. W. Chambers entered into of their early career, on their healths being toasted. It was a simple but touching narrative, and affords a fine picture of national feelings, thoughts, habits, and pursuits—a lesson to the right-minded and honestly aspiring of every country. As part of the literary history of a journal in such extensive circulation (some 70,000 weekly, we believe) we may notice what Mr. W. Chambers is reported to have said, in the following extract:—

"With respect to the quality of the literature embraced in the pages of our Journal, and of which you have been pleased to express so high encomiums, I feel that I only perform an act of justice in awarding incomparably the largest share of any merit it possesses to my brother; for, with a few exceptions, he has penned all those original essays on men and manners which are allowed to confer upon the work its highest value as a literary production. To myself has belonged the more immediate duty of editing, arranging, writing of articles of general instruction, and superintending the ordinary details of business. In this manner, by a happy difference of faculties and tastes, but with a lively harmony of feeling, we have been enabled to pursue a course which, if separated and unaided by each other's counsel and services, we could not prudently have ventured upon."

In his address, Mr. Robert Chambers also sensibly touched on topics which are well deserving of attention, as indicating the sources whence much of the intelligence and superior cultivation of Scotland is derived.

"My brother (he observed) has said that there is a great difference in our characters and faculties. It is on this account, perhaps, that I have to look back with livelier feelings of gratitude to the education I obtained in the burgh school under Mr. Sloane, than he had to do. To Mr. Sloane's mode of instruction in the classics, I attribute a very considerable portion of any power of amusing or instructing the public I have ever manifested. I feel, therefore, the liveliest sentiments of gratitude to that gentleman, and towards the burgh who appointed him to the situation which I am glad to see he still holds. I may mention at the same time, that my brother and I were much indebted to the library which was kept by the late Mr. Elder. This was a remarkably abundant library. It contained most of the classic works in the English language, and a great many other works of high merit. It was to our father we were indebted for access to this library, at ten or twelve years of age. He had the kindness and good sense to yield to our wishes in this matter; and before we left Peebles we had read a number of the principal works in the English language through this medium, so favourably placed before us."

In this we see the advantages of early, cheap, and sound common sense and virtuous education; of eligible schoolmasters; of local libraries; and of the other helps to youthful instruction which are to be found in almost every parish of Scotland; where not to be able to read and write is a disgrace, and where to obtain a competent acquaintance with sterling literature is accessible to all the middle classes, and to the children of the poorest mechanic or peasant who manifests a desire to seek for improvement above what is ordinarily allotted to individuals in their station. Many such have become ornaments to their native land.

But we have now finished our welcome task, which has been to add our testimony of regard to that exhibited at Peebles, and extend, whithersoever our page is wafted, a knowledge of the honour so properly conferred on two of our most meritorious fellow-labourers in the arduous field of popular literature, and who have widely contributed their share to the spreading measure of general improvement.

* The following is the inscription engraven on a silver plate on the inside of each box, the name only being different in each case:—"The freedom of the ancient and royal Burgh of Peebles having been this day conferred by the magistrates and Town Council upon William and Robert Chambers, Esqs., their fellow-townsmen, in testimony and approbation of their eminent services in literature, education, and popular improvement, which have rendered them famous throughout the civilised world; the admirers of these gentlemen resident in their native town and county invited them to a public entertainment on the occasion, and presented Mr. William Chambers with this box, formed out of oak taken from the foundation of the old Tweed Bridge at Peebles, of the age of which there is no record, and in which box his burgess ticket was placed.—4th August, 1841."

BRITISH ASSOCIATION NOTES.

"The Times" newspaper is very much shocked by the fact, that the members of the British Association eat breakfasts and dinners before and after the toils of the sectional meetings. A new sect of *starveling philosophers* seems to be in request; men who are above the petty wants of humanity; who would fly from Lord Morley's excellent *cuisine* at Saltram as if from a pestilence, and would defy hospitality in every Circean shape it could assume. For such doctrines we have written the following impromptu:—

A meeting of *savans*, forsooth!
Another name is fitter for't;
They're *gastronomes* at *Ply Mouth*,
And *bon vivants* at *Devon Port!!*

In the Section D it was hoped that Mr. Gray would describe a new genus of shells lately found about Woolwich, but nothing was brought forward on the subject, and there is not a single specimen in the British Museum. They are called percussion-shells.

The Earl of Morley, whom we have above commemorated for his liberal entertainment of members of the Association in his princely mansion, has a manorial right to all nameless wrecks between certain points of his estate on the sea-shore, near the Breakwater. It brings him a revenue, as we were told, of some 50*s.* a-year; but not long ago a valuable cargo of hides was washed ashore, and would have become the rights of his lordship but for a small piece of plank which floated in at the end, and bore the name of the lost vessel. "Why," said a member present, when the story was told,—"why did you not *hide* the plank?"

Portable soup was recommended at one of the ordinaries; but the President decided that all Portable soup was In-sup-portable!

A propos of soup and snails, of which soup, as we have heard, has been made for invalids, Dr. Buckland, on the Wednesday after the Meeting, in further investigating the theory of snails excavating cavities for their residence in limestone rocks, absolutely found an example where the creature had crawled in by a narrow aperture, and formed for itself a larger chamber in the interior, where it remained, it being impossible, from its increased size, to get out. This appears to be proof positive of the truth of the hypothesis which was so much questioned.

Quære, Was the landslip at Axmouth occasioned by an earthquake? Three miles from Weymouth, forty miles from Axmouth, and along the Dorsetshire coast, on the same stormy night, many parts of the cliff were precipitated into the sea. A farm, the property of Mr. Wood, in the parish of Ormington, lost about an acre of blue clay, which slid away like the land at Axmouth.

FINE ARTS.

NEW PUBLICATION.

Tableau Statistique, Géographique, et Héraldique, de tous les Etats d'Allemagne, compris dans la Confédération Germanique. Par J. F. A. Kraetzer-Rassaerts. London, 1841. Hearne.

This is at the same time the most perfect and splendid tabular history we have ever had submitted to our notice. On a large surface, surrounded by thirty-eight emblazoned arms of the different states and princes, there are concise but ample details of the geographical position and boundaries of each state, and the population, religion, form of government, revenue, and public debt of each principality; as well as minor details of considerable interest: the whole being concluded by tables for exchanging the various monies of Germany into the francs and centimes of France. The work, printed at the Imprimerie Royale of Paris, and the engravings, executed by Messrs. Dupuis and Breviere, is of paramount interest to a country so intimately connected with the Germans as England.

THE DRAMA.

Haymarket Theatre.—Foreign Affairs; or, the Court of Queen Anne, one of the smartest little comedies we have witnessed for a length of time, was brought out on Wednesday, and was received with genuine laughter and applause throughout. It is, in parts, broad enough, but without approach to offence, and so excellently well played by all engaged that it would be difficult for the severest critic to find fault. The *Count St. Louis* of Madame Celeste is a clever piece of acting, and in her own peculiar style. She sustained the principal and prominent character, admirably aided by Mrs. Stirling as a city dame elevated to the dignity of baroness, whose blunt and straightforward speech and actions keep her husband (Strickland) in perpetual dread of a breach of decorum; by Mr. Webster, as a court gallant; Mrs. W. Clifford, a designing dowager; Miss Charles, maid of honour; and Miss Horton, the simple daughter, and the object of the dowager's maternal solicitude, &c. &c. All these were played with full spirit and animation; the situations and incidents were provocative of laughter; the dresses splendid; and the whole a decided hit. Macready is running through his high range of tragic characters, *Virginius*, *Lear*, &c., and affording the dramatic world a noble treat by the various display of powers equal to every human passion.

Olympic.—An offshoot of the Astley's company, under the direction of the late treasurer, have been doing very indifferent business to very indifferent houses at this once popular theatre. It being an extra license, for the purpose of benefiting the sufferers from the late fire, many actors of reputation have starred it in aid of their less fortunate brethren. On Monday a young lady from America made her first bow before an audience of her own countrymen and women, in *Agnes de Vere;* and from the talent she displayed in this trying part, being almost unsupported (for the remainder of the company is so indifferent that theirs is no support), we should augur well: indeed, she is so charming in person, so *naïve* in manner, and altogether so very pleasant an actress, that she would be sure to make a *hit* in a properly regulated company. We have rarely met with a more promising *débutante* than Miss Mitchell.

Surrey Theatre.—This enterprising theatre closed a very superior operatic series of entertainments on Friday, and on Monday opened as an amphitheatre for Ducrow's equestrian performances. It was crowded throughout.

English Opera.—During the week a light farcical trifle, *The Lady and Gentleman*, has been played here with success. It consists of one act, one scene, and three *dramatis personæ*. Mrs. Waylett, who plays agreeably, and sings a charming ballad written for her, with the sweetness for which she is distinguished; Mr. Keeley, who dresses, looks, and speaks a droll part with his usual quiet humour; and Mrs. Selby, who has very little to do. The whole affair is a pleasant variety, and entitled to take its turn with other amusing after-pieces.

Strand Theatre.—*Barnaby Rudge*, No. 2, is being played (the devil with) at this theatre. Mrs. Keeley is the *Barnaby*, and while she is on the stage rivets the attention by her thrilling acting; but unfortunately the intelligence of her countenance, and the genius which renders her acting remarkable, are in this instance her enemies, and prevent her realising the author's conception. The rest of the characters are supported by others of the company with occasional effect. We preserve silence as to the *denoûment*, which must be seen to be appreciated for its absurdity.

Drury Lane.—This week the music of the *Tempest* has been played; and although the character of the melody is certainly better calculated for vocal than for instrumental arrangement, and is not therefore so effective in the orchestra as that of *Macbeth*, the popular airs, "Full fathom five," "Come unto these Yellow Sands," "Where the Bee sucks," &c. &c., fall pleasingly on the ear, and give additional attraction to these Concerts.

VARIETIES.

Sir David Wilkie.—The general meeting, to take into consideration the erection of a public memorial to the late Sir David Wilkie, is appointed for Saturday, the 28th: Sir Robert Peel in the chair.

Fine Arts.—Mr. W. Allan, the President of the Scottish Academy, and so well known by his fine historical and Asiatic pictures, has been appointed Her Majesty's limner for Scotland, held by the late lamented Sir David Wilkie.

Dramatic Authors.—A rumour is afloat that a coalition of several of our dramatic writers is forming, with the view to become lessees of the English Opera House, and have their productions played there.

The Thames Tunnel!!!—We are informed that Sir I. Brunel, accompanied by some friends, passed *through the Thames Tunnel* on Thursday. It was stated at the Plymouth Meeting by Colonel Sykes, in recommending the admission of youths to the Sections, that Brunel was made an engineer by seeing a cylinder at work when a boy.

Earthquakes in Scotland.—"The Perth Advertiser," and "Stirling Observer," contain accounts of the recurrence of these alarming phenomena in that place and the adjacent country, about two o'clock on Friday afternoon, the 30th ult. The convulsion lasted a minute, and was accompanied by a hollow grumbling sound, like distant thunder. At Comrie the shocks had been experienced during the week; but on this day the most severe occurred, and shook the stones from a house and threw down part of a stone dike. The inhabitants were so terrified that they all rushed into the street. At Pitlochry, Dunkeld, Aberfeldy, Auchterarder, Crieff, Dunira, St. Fillans, and Doune, and, indeed, throughout all the western district of Perthshire and Stirlingshire, the earthquake was distinctly felt, and seemed to be as powerful as that of 23d October, 1839. The day was boisterous, dark, gloomy, and cold. What say the *seismometers* at Comrie to the subject, which, according to the report of Mr. Milne to the British Association at Plymouth, are in operation within the church steeple,—at Comrie House, a quarter of a mile to the north, and at Garriechrow, two miles to the west?

Waterspout.—Portpatrick was on Sunday visited by one of these phenomena, which was so violent that it nearly destroyed twenty houses in the lower part of the town.

Dodd's Parliamentary Companion.—Mr. Dodd, with the industry and care which has distinguished his former productions of this kind, has already prepared and published an excellent list of the new Parliament. It contains all the comparative, political, and statistical information which is so valuable in a work of this class. Every one interested in the condition of this important legislative body will be gratified by having so full and good a guide to its componency.

A Gold Fish.—"The Scotsman" newspaper mentions that a small lively gold fish was lately taken in a salmon haul (in salt or brackish tide-water we presume), and placed in its natural fresh-water element.

LITERARY NOVELTIES.

Mr. Cooper some time since commenced a new novel, "The Deer Slayer." It is now out of his hands, and will be ready early in August. The time of the story is four days, the scene on Otsego Lake. Natty Bumps and Chingachgook are prominent characters in their early days.—*Boston Notion.*

LIST OF NEW BOOKS.

The Science of Gunnery, as applied to the Use and Construction of Fire-arms, by W. Greener, 8vo. 15*s.*—Lectures on the Second Advent, by the Rev. W. Burgh, 3d edition, 18mo. 4*s.* 6*d.*—Dr. Keith's Evidences of Prophecy, 24th edition, 18mo. 4*s.* 6*d.*—Baden Baden and its Neighbourhood, by R. H. Whitelocke, 18mo. 6*s.*—Map of the Rhine, in case, 4*s.*—Scriptural Illustrations of Genesis, chap. i. v. 16-27, 12mo. 5*s.*—An Author's Mind; the Book of Titlepages, edited by M. Tupper, post 8vo. 10*s.* 6*d.*—Questiones Virgilianæ, by J. Edwards, 12mo. 3*s.*—Virgil with Questions, by J. Edwards, 12mo. 6*s.*; without Questions, 3*s.* 6*d.*—South African Sketches, by Capt. H. Butler, royal 4to. 1*l.* 11*s.* 6*d.*—Introductory Book to Ollendorff's Method of Learning German, 12mo. 5*s.*—The Child's Book of Facts, edited by the Rev. T. Wilson, square, 2*s.* 6*d.*—Sturmer: a Tale of Mesmerism, by I. F. Romer, 3 vols. post 8vo. 1*l.* 11*s.* 6*d.*—Hand-Book for Lake Visitors, with Map, &c. 12mo. 3*s.*—Infant Baptism Scriptural, by W. J. Shrewsbury, 12mo. 3*s.*—History of Infusoria, Living and Fossil, by A. Pritchard, 8vo. 1*l.* 10*s.*—Mariolatry, or Mary Worship, 12mo. 3*s.* 6*d.*—Tracts of the Anglican Fathers, Vols. I. 1*l.*, 8vo. 9*s.* each.—Chronicles of Crime, by C. Pelham, 2 vols. 8vo. 1*l.* 8*s.*—The Pic Nic Papers, by Various Hands, edited by Boz, 3 vols. post 8vo. 1*l.* 11*s.* 6*d.*—Gilbert's Modern Atlas of the Earth, by R. Mudie, 4to. 2*l.* 10*s.*—George Julian the Prince, 8vo. 10*s.*—Three Memoirs of the Teeth and Epithelium, by A. Nasmyth, 8vo. 5*s.*—Dr. Jacobi on the Management of Hospitals for the Insane, with Observations by S. Tuke, 8vo. 9*s.*—The Biblical Cabinet, Vol. XXXII.; Rosenmüller and others on the Messianic Psalms, 12mo. 7*s.* 6*d.*—The Practical Works of John Bunyan, Vol. III. 5*s.*—Lectures on the Millennium, by the Rev. C. Burton, post 8vo. 7*s.*—Gems of Sacred Melody, by G. Worgan, imp. 8vo. 15*s.*—Parley's Tales about the World, by Wilson, square, 6*s.* 6*d.*

METEOROLOGICAL JOURNAL, 1842.

August.	*Thermometer.*	*Barometer.*
Thursday .. 5	From 57 to 64	29·71 to 29·58
Friday 6	.... 56 .. 67	29·59 .. 29·79
Saturday .. 7	.... 56 .. 74	29·92 .. 29·79
Sunday 8	.... 57 .. 67	29·68 .. 29·60
Monday .. 9	.... 52 .. 67	29·59 .. 29·65
Tuesday .. 10	.... 48 .. 65	29·72 .. 29·76
Wednesday 11	.... 54 .. 64	29·45 .. 29·60

Prevailing wind, south-west.

On the 5th, cloudy, with frequent showers of rain during the day; the 6th, morning cloudy, afternoon clear, evening overcast, with rain; the 7th, clear; the 8th, generally cloudy, rain at times; the 9th, generally clear, raining fast between six and eight P.M.; the 10th, evening cloudy, with rain, otherwise clear; the 11th, generally cloudy, raining frequently and heavily during the morning and afternoon.

Rain fallen, ·52 of an inch.

Edmonton. CHARLES HENRY ADAMS.

TO CORRESPONDENTS.

☞ The lapse of time, which occasions changes in all things, has, from circumstances of a private nature, led to the purchase of the entire copyright of the *Literary Gazette* by the gentleman who has been the sole Editor and part proprietor from its commencement. Though he has exercised a despotic and independent control over its literature during all that period, it has been difficult to disabuse the public of a certain degree of belief in interested and inimical misrepresentations,—that, being connected with eminent publishers, it was sometimes biassed in its views by prepossessions in their favour. There was not a particle of truth in this industriously circulated rumour; but it had, like all often-repeated falsehoods, a partial effect, which we take this opportunity to remove for ever, since the *Literary Gazette* is now entirely unconnected with "the trade."

With so largely increased a stake in its prosperity, the Editor begs leave to say that he will earnestly endeavour to infuse fresh spirit and vigour into its pages; will associate new and able allies in its various departments, and spare neither labour nor cost in making it worthy of general approbation. But to the numerous friends which it has made, and the multitude whom it has brought forward and served in literature, in the arts, in the sciences, and in other refined and intellectual pursuits, he would add, that no combined effort and expense are so effectual in producing excellence, as the assistance and co-operation of individuals who will think it worth while to communicate even the smallest articles of information upon the subjects embraced by the publication. Such aid he respectfully and cordially invites from his personal well-wishers, and from those who have been the well-wishers of the *Gazette* to the present day. Even already, within a few weeks, it has experienced the benefit of this feeling in a singular increase of circulation; and this cheering prospect will further animate the exertions to render it still more deserving of support and patronage.

For the present, we need not trespass beyond this brief announcement of the alteration in the copyright which has taken place, and conclude by hearty thanks to all who have hitherto been our friends.†

*** In making up even our enlarged page we find, that in order to make room for the interesting Reports of Professor Owen and Sir C. Lemon, we are obliged to postpone a couple of pages of the Friday's Sectional proceedings (F and G), and a portion of Reviews and Advertisements, which shall appear in our next. Our Paris Letter brings up an arrear of Continental intelligence, scientific and literary.

"W. D." writes very feelingly, but we have not opportunity at present for his poetic contributions.

We have to acknowledge the receipt of the report of the case in the Court of Queen's Bench, "Bell *v.* Beasley," &c., with Mr. Bell's remarks thereon; but any notice of legal proceedings is, of course, out of our jurisdiction.

ERRATA.—In our Report of the British Association Proceedings at Plymouth, we have spelt the name of Professor Robinson of Armagh, "Robison," which our readers will please to correct. In our Vienna letter last week, the letters "T. M." were misprinted for "P. M." viz. Prince Metternich—the orthography being rather foreign.

† We have resolved hereafter to receive respectable Advertisements of a miscellaneous character; and to make room for them, and the additional and original matter contemplated among our improvements, we shall print extra half-sheets whenever they are necessary.

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WILKIE MEMORIAL.—The General Meeting of the Admirers of the late SIR DAVID WILKIE will be held on Saturday, the 28th instant, at the Thatched House Tavern, St. James's Street, when

The Right Hon. SIR ROBERT PEEL, Bart. M.P.

Will take the Chair, at One for Two o'Clock precisely.

ALLAN CUNNINGHAM, Hon. Sec.

27 *Lower Belgrave Place,*
10*th Aug.* 1841.

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